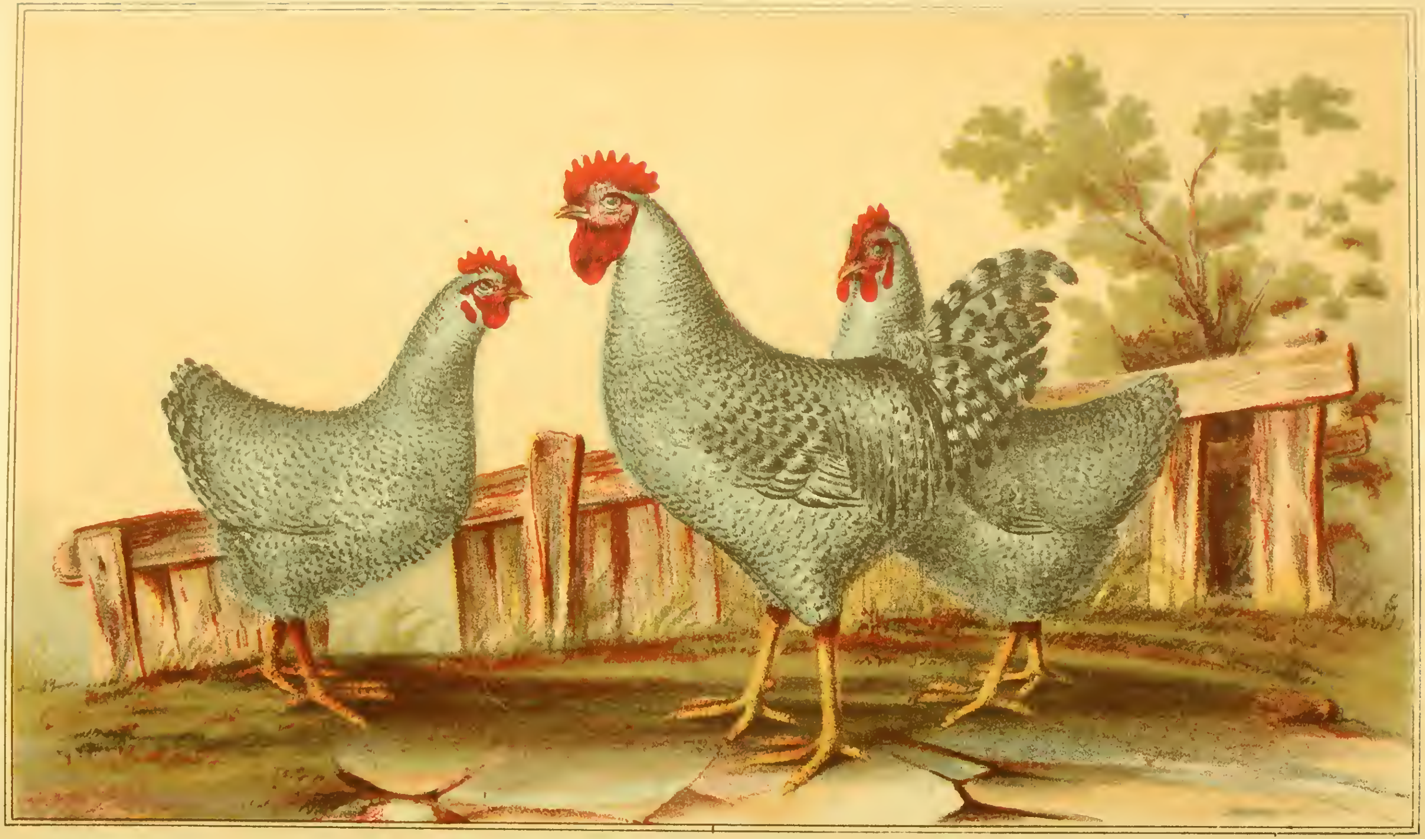
UMASS/AMHERST
312066 0285 1605 3

SHOUT
SHARE
IT

[illegible]
STATE AGRICULTURAL
EXPERIMENT STATION
AMHERST, MASS.

[illegible]



BUFFORD BOSTON

PLYMOUTH ROCK FOWLS, FROM THE BREEDING STOCK OF EDWARD A. SAMUELS, WALTHAM, MASS.

SEE PREFACE TO ABSTRACT

TWENTY-FOURTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

Massachusetts Board of Agriculture:

WITH AN APPENDIX,

CONTAINING

REPORTS OF DELEGATES APPOINTED TO VISIT THE COUNTY EXHIBITIONS,

AND ALSO

RETURNS OF THE FINANCES OF THE AGRICULTURAL SOCIETIES,

FOR

1876.

BOSTON:
ALBERT J. WRIGHT, STATE PRINTER,
79 Milk Street (corner of Federal).
1877.

STATE BOARD OF AGRICULTURE—1877.

MEMBERS EX OFFICIIS.

His Excellency ALEXANDER H. RICE.
His Honor HORATIO G. KNIGHT.
Hon. HENRY B. PEIRCE, *Secretary of the Commonwealth.*
WILLIAM S. CLARK, *President Mass. Agricultural College.*
CHARLES A. GOESSMANN, *State Agricultural Chemist.*

APPOINTED BY THE GOVERNOR AND COUNCIL.

	Term Expires.
LEVERETT SALTONSTALL, *of Newton*,	1878
PAUL A. CHADBOURNE, *of Williamstown*,	1879
MARSHALL P. WILDER, *of Boston*,	1880

CHOSEN BY THE COUNTY SOCIETIES.

Massachusetts,	CHARLES S. SARGENT, of Brookline,	1880
Essex,	GEORGE B. LORING, of Salem,	1878
Middlesex,	JOHN B. MOORE, of Concord,	1879
Middlesex North,	JAMES T. BURNAP, of Dunstable,	1880
Middlesex South,	ELIJAH PERRY, of Natick,	1878
Worcester,	O. B. HADWEN, of Worcester,	1878
Worcester West,	ADDISON H. HOLLAND, of Barre,	1878
Worcester North,	STEPHEN SHEPLEY, of Fitchburg,	1878
Worcester North-West,	ENOCH T. LEWIS, of Athol,	1880
Worcester South,	NATHANIEL UPHAM, of Sturbridge,	1880
Worcester South-East,	WILLIAM KNOWLTON, of Upton,	1879
Hampshire, Franklin & Hampden,	MILO J. SMITH, of Northampton,	1879
Hampshire,	HENRY C. COMINS, of North Hadley,	1880
Highland,	METCALF J. SMITH, of Middlefield,	1878
Hampden,	J. N. BAGG, of West Springfield,	1879
Hampden East,	HORACE P. WAKEFIELD, of Monson,	1879
Union,	FRANKLIN C. KNOX, of Blandford,	1880
Franklin,	ARTHUR A. SMITH, of Colraine,	1880
Deerfield Valley,	E. C. HAWKS, of Charlemont,	1878
Berkshire,	JOHN E. MERRILL, of Pittsfield,	1879
Hoosac Valley,	WILLIAM E. JOHNSON, of Williamstown,	1879
Housatonic,	DANIEL B. FENN, of Stockbridge,	1879
Norfolk,	HENRY S. RUSSELL, of Milton,	1880
Hingham,	EDMUND HERSEY, of Hingham,	1879
Bristol,	EDMUND H. BENNETT, of Taunton,	1878
Bristol Central,	JOHN A. HAWES, of Fairhaven,	1879
Plymouth,	CHARLES G. DAVIS, of Plymouth,	1878
Marshfield,	GEORGE M. BAKER, of Marshfield,	1879
Barnstable,	S. B. PHINNEY, of Barnstable,	1880
Nantucket,	ALEXANDER MACY, Jr., of Nantucket,	1879
Martha's Vineyard,	HEBRON VINCENT, of Edgartown,	1880

CHARLES L. FLINT, *Secretary.*

TWENTY-FOURTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

BOARD OF AGRICULTURE.

To the Senate and House of Representatives of the Commonwealth of Massachusetts.

The centennial year, with its excitements and its joyous memories, has passed away without bringing any material relief to the general depression of the business and financial interests of the Commonwealth or of the country. Stagnation in manufacturing, mechanical, and mercantile industries implies wide-spread distress among those, comprising whole classes of the community, who are dependent upon them, and thousands able and willing to work have waited idly, with whatever patience they could call to their aid, compelled to witness the gradual dwindling away of their scanty accumulations, and to look forward with anxious forebodings to the untried future.

In the midst of all this distress, the farming population has suffered less, comparatively, than any other class of people. It has been a year of more than usual healthfulness. No epidemic has decimated our flocks or our herds, and though the excessive heat and drought of summer interfered with the growth of some crops, causing losses here and there, no general distress has followed. Abundant stores have filled our barns and our cellars, sufficient, at least, to remove any apprehensions of want for the winter. No greater proof is needed of the stability of farming as an occupation, or of the substantial prosperity of an agricultural community.

The good effects of legislative action, designed to secure the public against fraud in the manufacture and sale of fertilizers, by providing efficient scientific inspection, are already apparent throughout the State, and one of the striking features of the past season was the greatly increased culture of Indian corn, and the unprecedented use of commercial fertilizers as compared with any previous year of our modern farming. This itself shows an increased public confidence in these articles, an element that was wanting previous to the appointment of a competent state inspector. The quality of the fertilizers sold in our markets is unquestionably improved, and the standard is much higher than formerly, while the farmer has some protection against fraud in case he exercises ordinary care in his purchases. The importance of this change, in its influence upon the future of our agriculture, can hardly be overestimated. Nothing is more certain than that successful farm production of any kind here in New England, and, indeed, with slight exceptions, the world over, depends upon the abundant supply of plant-food in some form or other. Nothing is more certain than the fact that the quantity of stable or barn-yard manures that can be made available on any particular farm, is limited and falls far below our wants. If the deficiency can be made up by concentrated fertilizers, with economy and profit, the possibility of the production of human food will be vastly increased and the general prosperity promoted.

PUBLIC MEETING OF THE BOARD

AT WORCESTER.

The country meeting of the Board, for this year, was held at Horticultural Hall, Worcester, November 14, 15 and 16. The meeting was called to order at half-past eleven o'clock on Tuesday, November 14, by O. B. Hadwen, Esq., of Worcester, a member of the Board, representing the Worcester County Society.

Mr. Hadwen addressed the meeting as follows:—

Gentlemen of the State Board of Agriculture:—In behalf of the committee of arrangements, and in conformity with a custom which has grown into favor with these meetings, it becomes my duty, as their chairman, to call this assembly to order. I do this with the greater pleasure, as I am thus able, personally as well as officially, to welcome you, gentlemen, to the heart of the Commonwealth, the centre of agricultural interests, second to none in variety and importance within the limits of your official supervision.

I welcome you to the goodly city of Worcester, where almost every industry thrives upon a patronage not limited by state or national boundaries,—and I welcome you to Horticultural Hall, the headquarters in this city of one of the interests you have especially in keeping.

The time and place would inspire almost any other than myself with words corresponding with the surroundings and the occasion. I would I had the gifts upon which inspiration moves and through which it makes itself interestingly manifest; then, gentlemen, the embarrassing duties of my position here would lose themselves in the pleasure with which I should address you in welcome.

I esteem it fortunate for the agriculture and the horticulture of our county that the Board meets at Worcester and in this our Horticultural Hall. Gathered as you are from every portion of the State, your discussions will spread abroad useful knowledge, coupled with descriptive experience, both tending to develop those agricultural resources of the State and county which are so essential to the happiness and prosperity of both.

I need not remind you of the benign influence such gatherings exert in promoting "the most healthful, the most useful, and the most honorable employment of man."

Worcester County, lying in the central portion of the State, traversing its entire width, compares favorably in respect to its fertility of soil with any county in the Commonwealth. The farming mostly pursued here is what is commonly called "mixed farming," the dairy being the most prominent and leading interest. All the cereals, fruits, roots and grasses that this latitude favors, thrive here. In many towns, a high course of farming is pursued and lands are worked to produce profitable crops.

We have been favored for a long series of years with men who have devoted their lives to the progress of agricultural pursuits, and their example and influence have led many to take an interest in and obtain a living by agriculture. And when we see so large a proportion of our people devoted to this interest in all its legitimate phases; when we recognize the fundamental truth that the ground which we cultivate is the primary source of all wealth; and more than this, when we remember that without its annual products of grains and roots and fruits and vegetables for the use of man, and the herbage and grasses from which our stock gather their sustenance, all other interests would be paralyzed, we can at once realize the importance of agriculture in relation to all other industries in this county.

Among the most noticeable and cheering phases of advancement among our farmers that forcibly strike the eye of the observer, is the marked improvement in their grounds and dwellings. Happily the era is fast passing away, in which farmers, either rich or poor, in any section of our county, deem it compatible with their interests, and with the dignity of their vocation, to live in homes deficient in comforts or embellishments such as the age now demands.

Grounds about their buildings are receiving more care and attention, and are frequently embellished with trees and shrubs and flowers, indicative of a growing taste and a love for beautiful things. Great improvements are taking place in our methods of farming, fruit culture is receiving increased attention, and the general management of farms is continually presenting evidence of general economy and thrift. Our farmers have not been slow in introducing upon their farms the improved machines and implements of husbandry; the best and purest seeds are eagerly sought for, and the best live-stock is slowly but surely taking the place of inferior.

Several organizations in this county have contributed to these results, and I believe I shall be justified in passing them briefly in review.

The Worcester Agricultural Society, the oldest and for many years the only Agricultural Society in this county, was incorporated February 23, 1818, having for its object the promotion of agriculture within the county.

The first exhibition took place in the month of October, 1819, on the Common in front of this building, and its annual cattle-shows have regularly continued, with one or two exceptions, to the present time. Its exhibitions have been attended with all the advantages, and probably more, than could have been anticipated at its incorporation. By its long-continued influence in bringing to its annual fair the best stock and products, and by the liberal premiums offered and paid for every breed of cattle and farm and garden product deemed worthy of encouragement, it has accomplished untold good.

It has thereby facilitated the introduction as well as the breeding of the most desirable foreign and native breeds, and has enabled the prudent and sagacious farmer to infuse into his horses, cattle, sheep, swine, and poultry the best blood of the world. There is, however, still room for improvement in this department of our farming, and the next quarter of a century will undoubtedly develop increased interest and more beneficial results. The discoveries in the science of breeding domestic animals, which is now in its infancy, will improve and Americanize our live-stock, giving us such as are especially adapted to our wants and climate, as well as such as will please the eye of an educated fancy.

The society has about twenty-four acres of land about one-half mile west of Main Street, on which is included a one-half mile track and spacious buildings for the accommodation of its annual exhibitions.

Five other agricultural societies, daughters I may say of this society, with similar organization, and under the patronage of the State, occupy points within our county at the north, east, south, and west of us, while most of the prominent towns have their local societies and annual shows of cattle, farm and dairy products, fruits, flowers and manufactories; their influence has been manifest and permanent.

The Worcester County Horticultural Society, by whose liberality we now occupy this hall, was organized in 1840, and incorporated March 3, 1842. You will indulge me in a brief allusion to the history of the society. In the year 1840, several gentlemen, desirous of forming an association for encouraging the cultivation of fruits and flowers, and exciting a higher interest in the growth of all the products of the field, the orchard, and the garden, and to disseminate and spread abroad useful knowledge and the results of experience and observation tending to improve and encourage horticulture, made their first organization by choosing the late Dr. John Green president, with the late Dr. Samuel Woodward and the Hon. Stephen Salisbury vice-presidents, and ten trustees.

The society held its first exhibition on October 13, 14, and 15, 1840, in the Town Hall. The exhibition comprised little else than a meagre and confused collection of apples and pears, of which only a few were designated correctly by name, a very few quite ordinary vegetables, with some fruits and flowers contributed by gentlemen residing in the vicinity of Boston.

The late George Jaques, while president of the society, in his address before the society on the occasion of awarding the premiums offered by the society in September, 1863, spoke as follows in relation to the early period of the society's work, in contrast with the results of the fair in which he was speaking: "It is now twenty-three years since the preliminary steps were taken toward the formation of this society. Those who remember the condition of horticulture in central Massachusetts then, in 1840, contrasted with what we may well be proud of now, in 1863, will hardly accuse me of extravagance in asserting, that the progress which we have made in less than a quarter of a century, is greater and of more value than all that horticultural science and industry had previously accomplished here, since the wolf and savage prowled over the grounds where all this profusion of beauty around you was grown."

When we reflect that, for the period since 1863 to the present time, the society's exhibitions have been regularly progressive,—when we reflect upon what has been accomplished by the introduction of new fruits, many having their origin in this county, that have won the admiration of horticulturists wherever grown,—we surely have cause for greater encouragement, and may hope for still greater acquisitions through the influence of this society,—a society which the father of this

Board, the Hon. Marshall P. Wilder, has from this platform declared to be the second horticultural society in the world in point of wealth and influence.

Elaborate and instructive reports emanating from the accomplished pen of the secretary of the society have appeared in the annual Transactions for the past fifteen years, portraying the best means for improving the condition of the society and stimulating the cultivation of fruits and flowers most desirable, and discarding those that have proved worthless.

With the liberal bequests and contributions of many gentlemen who have been favorably disposed toward the society, this hall was erected in 1851, and since that time has been twice remodelled to accommodate the growing wants and interests of the institution, and now stands a fitting monument in remembrance of those whose bequests and exertions have successfully placed in the ownership of the society a building so substantial, valuable, and convenient.

The library, in an adjoining room, is one of the most extensive and valuable of its kind in the country, and will commend itself to gentlemen who may take the trouble to give it an examination. Every new work of known value is added to it yearly, by an annual appropriation for the purpose.

Mechanical science, theoretical and practical, is so closely allied to agriculture, that no power can separate them. He who cultivates the soil must have implements, working-tools, and very many of the products of mechanical skill and industry. He who works in iron or wood, or follows other pursuits, must have the wherewithal to feed and clothe the body, the productions of the farm.

So, allied in interest to our agricultural and horticultural societies, we have a mechanics' association, in which all the trades and industries of the city and county find representation.

The association owns the largest building and hall in this city, has its annual course of lectures and its occasional exhibitions which rival any local exhibitions in the land, and one of the most extensive libraries in this city of libraries.

Then there is the lyceum and library associations, with a natural history department and museum of natural curiosities, in which may be found much to instruct the inquiring farmer in the line of mineralogy, conchology, zoölogy, and, especially, "bugology." He will be a poor observer if he does not recognize some friend and many enemies in the serried ranks of this latter department.

I haven't time to speak fittingly of all the points and places of interest which surround us here, but you must understand we all have a commendable pride in the city of our homes. Why shouldn't we? You must understand that in the lifetime of the speaker, this place has grown from a town of 3,500 inhabitants to a city of more than 50,000 people, having a permanent valuation of $50,000,000, and an annual product of $20,000,000 more. You must remember all this is the result of active industry in various directions; a pushing, driving energy in every business relation.

You must remember that Worcester is, and has always been, the head-centre for the manufacture of agricultural implements. More practical inventions have, in this line, emanated from her limits than, I had almost said, all the world beside,—two hundred and twenty-five different kinds of ploughs being made by one company within the past forty years.

Here the invention of the first planing-machine made a revolution in the business of building, and the first machine for the working of leather made our large boot manufactures possible. I believe it has been said truly of our city, that if a machine or implement of any kind, for any legitimate purpose under heaven, is wanted, one need only apply to a Worcester inventor and mechanic and it will be forthcoming. We do not claim that Worcester is the centre of the universe, though the sky does shut down so nicely all around her; but we may claim that she is the centre from which many interests radiate, and to which many connecting interests point as to a mechanical and agricultural Mecca. All acknowledge her as the "heart of the Commonwealth," whose pulsations are healthy and strong, whatever may have diseased the body politic or the business energy of the land.

The location of this city in the midst of an agricultural and manufacturing region, with her system of railroads radiating in every direction, has undoubtedly favored her growth and prosperity. And with her growth and prosperity have come all the other advantages she enjoys. Look at the public buildings and grounds,—her antiquarian and free public libraries, where anything in the shape of ancient or modern literature is accessible to the public; her technical institute for free education in scientific or mechanical pursuits; her normal school for the preparation of teachers for our common schools; her insane asylum, where the mind diseased is ministered to and restored; her mammoth manufactories for the working of iron and wood and leather, and fitting material into myriad forms promotive of human energy and enjoyment. Such, in brief, is the Worcester of this centennial year, the city in which you are to-day assembled.

To her hospitalities we welcome you, gentlemen of the Board of Agriculture. May the purpose of your coming be accomplished in an outgoing and ingoing ratio, that while you give us the words that shall proceed from the heart of a well-developed experience, moving us to greater strivings after the perfect of your ideal, you may feel the invisible and unspoken pulsations of the "heart of the Commonwealth," by which you are surrounded, moving you also to continued strivings after those things which seem to you to be higher and better.

Mayor JILLSON, who had been expected to address the meeting, being detained at home by illness, the Board, at the conclusion of Mr. HADWEN'S address, adjourned to two o'clock.

AFTERNOON SESSION.

The Board was called to order soon after two o'clock by Mr. O. B. HADWEN, who stated that the subject for consideration was "Fruit and Fruit-Culture," the discussion of which would be opened by Mr. T. S. GOLD, Secretary of the Connecticut State Board of Agriculture.

FRUIT AND FRUIT-CULTURE.

BY T. S. GOLD.

You will be disappointed if you expect from me an account of any new or startling discoveries in fruit-culture; but still it may be profitable for us to spend an hour in reviewing this old and familiar subject, perchance to root out some old prejudices, to break up some of our unthrifty habits, or more firmly to ground ourselves in established truths, to thus make our efforts in fruit-culture more agreeable and more successful. Excuse personalities, for I come as an enthusiastic lover of fruit, and somewhat successful cultivator, to talk of my experience, but without any pet theories which alone must be followed to insure success.

Fruit is too much considered as a luxury, and not enough placed on the list of necessary and economical articles of diet. It is not difficult to provide a supply of fresh fruit in succession and variety during the whole year. The strawberry comes first, followed, without intermission, by the raspberry, currant, blackberry and whortleberry. Cherries, peaches, plums and grapes cover the five months from July to November, while the pear, beginning in July, is in season for six months; the apple, the most democratic of all, rounds out the year with varieties, some of which are in perfection for the whole twelve months, and we only tire of old apples because the new are better. In most localities in New England, all these fruits can be raised, and, in many cases, in a degree of perfection unsurpassed by many sections devoted especially to fruit-growing, and which enjoy a great reputation for their fruits.

Fruits are, to most persons, not only agreeable, but they form an economical and healthful article of diet. They should be used freely, raw or cooked, in a simple form, two or three times a day. The substitution of choice fresh fruit for dessert instead of the everlasting pastry that has done so much to undermine the health of New England, not only gives us that which is more economical, but more healthful. Baked apples, of choice varieties, simple, or eaten with sugar and cream, according to fancy, are within the means of every one, yet they cannot be surpassed by any table luxury, the product of any clime.

I have spoken of the healthfulness of fruit. Children who have free access to, and indulge their appetites without reserve in fresh fruit, enjoy the fullest measure of health. When the supply is irregular, or the quality injured by keeping or neglect, or it is imperfectly ripened, as is often seen in our markets, and sickness follows its use, we are too apt to offer a wholesale charge against fruit, to condemn it utterly. Two oranges eaten by me at once, when a boy,—peel and all,—gave me such a surfeit of that fruit, that, for a long time, I remained very shy of it.

As some persons take fruit in the morning, others at evening, some before and some after meals, and some at intervals, and others almost continuously, and these regular fruit-eaters do this, not only without inconvenience, but evidently with enjoyment and benefit, it would be idle to advise about the proper time and manner of eating fruit; individual habits and preferences will control, and must be allowed to have their rights.

The varieties and condition of the fruit have more to do with its healthfulness than the hour of the day, and the old proverb of fruit, "gold in the morning, silver at noon, and lead at night," must be laid up for use with many others, only when it fits our case.

With only the old Orange or Sugar pear for summer, and Choke pear for autumn, it is no wonder that pears had a reputation of less healthfulness than other fruits, from which they have not entirely recovered. Again, their period of perfection is so rapidly passed,—bad when green, luscious, melting and refreshing when just ripe, but cloying and disturbing when past this point of perfect maturity, much worse than when unripe,—this bad reputation attaches to the whole family of pears, and even stains the whole catalogue of fruits.

Again, with the apples—the tender, melting Fameuse, or Snow apple, with its mild subacid juice, suits every stomach; while a wilted, poorly ripened Spitzenberg is certainly no more digestible than a raw turnip. The Yellow Bellflower is an example in itself of the extremes of quality. Well grown, upon a kindly soil and in a favorable season, it is one of the most delicious and refreshing of apples, tender and delicate in texture and flavor, its swollen sides bursting with juice. Poorly ripened, grown on neglected trees, it would never be recognized by its best friends, whose acquaintance with it was only when in prosperity. Even the swine refuse it to the last in a mixed orchard, and would pass it as the most unpromising wilding.

In my mind, running over the long list of apples and pears,—the Yellow Bellflower only appears as an extreme case,—the same rule holds good with all in a greater or less degree. A large part of the discrepancy that arises in our opinions of the various fruits may justly be attributed to the different conditions under which we plant them, even with the same natural advantages. In grafting a Winter Nelis upon the branches of a healthy tree that has attained bearing size, we have fruit that ever places it upon our catalogue as one of the most beautiful and delicious of pears. On the other hand, received as a weak, crooked tree from the nurseryman, with stem and shoots too slender for self-support, planted in common soil, it grows and bears, it is true, but its fruit fails to secure any notice, for it is unworthy of it, and the variety is condemned. Again, the Vicar of Winkfield, overbearing even when poorly fed, has no juice but a sour water, and the farmer leaves it to the winter's wind, as not worth the gathering, while well grown and well ripened, it becomes one of the most refreshing of winter pears. But it is useless to multiply examples. It is the general rule with fruit-bearing plants, well fed and well cared for, returning abundant crops of luscious fruit; and because, forsooth, they do not always die out immediately, or refuse to bear at all, we tolerate this neglect, and get our half crops, and even those just when fruit is too abundant to be valuable. The chance example of trees, that by accident enjoy favorable conditions and make good returns to the careless cultivator, with no efforts of his own, are not investigated, and consequently we do not gain the instruction we should from their teachings. Instead of learning from them how to treat a tree, so that it may grow and bear choice fruit, we rather view them as chance favors. Rather should we study the conditions which surround every case, either of success or failure, whether those conditions were accidental or the result of design, and thence draw rules for our guidance.

It is all very well, some will say, for each farmer to attempt to raise a supply of fruit for his own family, but as for raising it for market, it will not pay, for it is only in the barren years that fruit (apples and pears) is in demand; when there is an abundance there is no sale. To meet these objections, we would have no barren years with our orchards, with certain unavoidable exceptions, and we would use the surplus in plentiful years for feeding our stock. Because an occasional surfeit has dried up the cows, or a case of choking has occurred, and there are men very fond of cider, we are continually reminded of the danger of allowing cows to range in orchards, and that little good can result from feeding them to stock in any manner. Prof. L. B. Arnold, in a recent article, estimated the value of apples for milch cows at twelve and a half cents per bushel. This is when they are fed with prudence.

From my own experience in feeding thousands of bushels, not only as falling from the trees, but gathered in the barn-cellar for winter stores, for neat-stock, horses, sheep and swine, I would place their value nearly as high as does Mr. Arnold. The sweet and firm-fleshed varieties would of course be preferred, but a mixture of sour ones need not be feared. In the extreme drought of the past autumn, the range of an orchard, where the cattle could gather the falling fruit, has been found a most valuable addition to the scanty herbage of our parched fields. The possibilities of yield of an orchard are such as to make its value for stock-feeding alone take the very front rank among cattle foods. At the very moderate yield of ten bushels per tree, forty trees per acre, we have four hundred bushels, at one shilling per bushel, amounting to fifty dollars per acre, as an addition to the crop of grass for pasturage.

To prevent choking, we cut or crush the apples fed to cows in the manger; but with some twenty acres of orcharding, and scattered trees in all our pastures, with nearly one hundred head of neat-cattle, we have not in thirty years had a case of choking from apples. Beginning to eat them when calves, they never forget how to eat apples. I will now give, in brief, my opinions on orchard-culture; and first, as most important,—

LOCATION.

Any good strong soil, adapted to corn or grass, is suitable for an apple orchard. In those sections where there is a hardpan, a tenacious subsoil, it should be dry, either from natural or artificial drainage; and from the experience of the last few years of drought, we would say it cannot well be too dry. For quality of fruit, as well as thrift of the trees, the roots must not be soaked with standing water; yet gravelly soils, where there is no hardpan, seem to teach a different lesson. In seasons of drought, the fruit ripens and falls prematurely, and some varieties of apple-trees utterly die out. The winter of 1872–3, that proved so fatal to evergreens in our cemeteries and lawns upon dry soils, also proved the death of thousands of apple-trees, mostly Baldwins, in the State of Connecticut, in orchards located on well-drained, gravelly soils, generally in the valleys, while upon the hills, with a heavier soil, they escaped unharmed. Sudden changes of temperature may have something to do with it, circulation may have started and been suddenly checked, but we think the trees died of the winter drought. The evergreens upon our hills and valleys in their native soils were unscathed, while the same, transplanted, and even well established, were smitten. The life was dried out by those piercing winds, when not sustained by moisture at the roots.

A sheltered hill for New England is better than a valley; we escape frosts. A reasonable circulation of air promotes the health of the trees and fine color in the fruit, and prevents that prematurity sometimes induced by a hot September. Upon the hills, the east winds are more to be feared than from any other direction, for with them come ice-storms, the most fatal scourge that ever afflicts our orchards. Generally, upon our strong soils,—not too heavy,—we have the best-flavored fruit; the exceptions being in regard to some varieties, and to seasons wet and cold, when the warm, quick soils have the advantage.

Having the field selected, the preparation of the soil for planting will have much to do with our future success. It should be not only good of itself, but in good heart; that is, not exhausted by excessive cropping, or by previous occupancy by orcharding; and should be well fertilized with barnyard manure, or some other fertilizer of as permanent a character as can be obtained.

In planting an orchard last year, I applied to the field of eight acres, eight tons of Peter Cooper's hair-manure,—the refuse from the glue-factory, consisting of hair, a little lime, and fragments of bones. I hope this, by slow decomposition, will furnish food, as needed, for a term of years. One year's culture with corn, or some other hoed crop, will fit the field for planting. Plough the whole field, and mark the rows, at least one way, with the plough, having previously laid them out straight; two rods apart is a good distance for the trees. This gives forty trees per acre. Two by four rods is none too far for the strong growers.

VARIETIES.

In planting for market, select only a few standard sorts, known to do well in the district. It will save great trouble in the harvesting and sale of the crop. The only reason for varying from this rule is, that, by variety, we have a greater chance for fruit in unfavorable years. If the orchard is for family supply, consult your own taste, and have as many varieties as you choose. I have about one hundred varieties of apples, and there are fifty of them that I would like to retain, as each has some special merit.

In naming varieties, the Baldwin would take the lead, except in those sections where it is tender. The Rhode Island Greening is a general favorite. The Westfield Seek-no-further is a slow grower, but a good bearer of smooth, fine-flavored, handsome fruit. The Northern Spy is a fine grower, and, when old enough, bears abundantly very fine apples, but they do not always keep well. The Hubbardston Nonsuch is a fine, smooth fruit, of superior quality, bears young and abundantly, and the tree does not attain a large size. The Hurlburt is a most rapid grower, a great and regular bearer, and an excellent fruit. These two last are for early winter. The Fameuse, or Snow apple, is still earlier, and the prince of dessert apples in New England. If our orchard was confined to one tree, it should be this. The Porter is ripe in September, and the earliest apple we can send to market. The Tallman Sweet is a good winter sweet apple. We would recommend these eight varieties for any orchard, but, for family use, would enlarge the list, beginning with the Early Bough, Early Harvest, and other summer varieties.

If you make personal selection of the trees in the nursery, you will be apt to reject some kinds, that have an unfortunate or feeble habit of growth, that the samples of fruit on the exhibition tables would commend to you. If you leave the selection entirely to the nurserymen, of course you will get only the strong, vigorous growers; and if you make your own selection from the catalogue alone, you will have many troublesome specimens. Having already a selected list, it will be best to select, personally, in the nursery, choosing only those with strong stems, well-balanced heads and roots,—the best trees of each variety. Few will take this trouble, and a still smaller number have the skill to make a judicious selection. All the best growers do not bear the best fruit, and in our eagerness to get shapely trees, we may loose sight of our ultimate object,—the fruit.

Nurserymen raise good trees, but we are not satisfied with the way they are taken up; many of the roots are so mutilated that the tree can never recover from the shock. We can excuse them for mistakes about varieties, but we cannot excuse their wholesale mutilation, amounting often to the destruction of what they have propagated with so much care and skill. Their only excuse is the press of business,—no time to spend, and the difficulty of getting help that can be trusted.

We prefer spring planting, with no very satisfactory reasons for the preference. If fall planting is undertaken, we would attend to it early, so that the wounded roots might commence repairs, and the earth become well settled before winter. At planting, cut smooth all broken roots, and remove fully one-half of the head by thinning out and cutting back. In the mellow, well-ploughed soil, the holes need be only large enough to receive the roots, carefully extended. Pack fine dirt around the roots, avoiding manure, especially if fresh. The roots should not be allowed to get dry, though the tree may live and lose most of its roots; yet a rainy day has no special advantages for this work. At such times the sticky earth will not pack about the roots, and spaces will be left, than which nothing can be more fatal to success. Not one tree in a hundred need be lost, yet it is too true that, taking into account the losses from animals and insects, from freezing and drying of the roots, and careless removal and planting, probably not fifty of the fruit-trees raised in our nurseries are alive at the end of five years from their removal. Every one expects his trees to be the exceptionally successful ones, and so we plant with the share for the brush heap in our full knowledge, and we continue to furnish it.

We prefer young trees, two years from the bud, to those that are older; large trees suffer so much by removal that smaller ones often outstrip them in growth.

The orchard should receive careful tillage for some time after planting; for how long will depend on circumstances, and generous manuring will be required as long as it is expected to bear fruit. This should not be excessive, but liberal and regular. Wood ashes are preferred, but barn-yard manure as a top-dressing will do well. Continuous surface culture may be advised on level fields, but these fields are the exceptions in New England. Upon all hillsides, our best orchard land, the water will wash away the soil if grass is excluded. Deep ploughing after the trees have attained some size is very bad for an orchard; a temporary growth is sometimes thus secured, to be followed by a check, worse than the former state.

We do not know of an orchard that has been ploughed after maturity, that has been benefited, but the reverse has been often true. All the most vigorous old trees that we have seen, have stood in grass.

Not only is this ploughing detrimental to the thrift and longevity of the trees, but it is injurious to the character of the fruit. When we took possession of our farm, nearly forty years ago, there were several old orchards, mostly of native fruit; one was in pasture, never ploughed,—too rocky; one ploughed, with succession of crops, as corn and potatoes, oats, rye, then grass mowed for four or five years, then ploughed again, but without manure; another, partly mowed, with manure, the other part ploughed and cropped and then mowed while in grass, without manure; the fourth, divided by a lane, so that a part was in permanent grass, mowed and manured, a part pasture and the remainder pastured when in grass, but often ploughed and cropped. As a boy, fifty years ago, I remember them all as bearing abundantly, with fair fruit. The next twenty years showed a marked decline in quantity and also in quality for most of the trees, many of the trees also dying. Much of the fruit was cracked and spotted, and this general decadence was most marked in the case of the trees where ploughing was practised. The trees there never attained the proportions of those standing where the plough was never used. At that time we changed the system. Permanent meadow, with top-dressing, or permanent pasture, took the place of the previous exhausting system.

Pasturage means manuring also, for the cows from a large range prefer to lie in the orchard. The result has been, that the trees not too far gone have taken a new lease of life, the fruit has improved in quality, is less scabby and cracked, and especially is this true of the orchard devoted to pasturage; and not only is there benefit in this direction, but also the apple-worm or codling-moth is kept in check, as the cows consume all the fallen fruit, and here we have our fairest apples.

Young orchards, planted since, and coming into bearing, have been pastured with swine, horses, or sheep, with satisfactory results. They were allowed to limb out too low to allow of pasturage by cows, till the fruit has been gathered, when they are given the range.

As another illustration, two native trees were taken up from the field and planted in the border of the garden, exposed to the plough, a hundred years ago, on account of their choice fruit. Thirty years ago this was worthless from cracking. Permanent grass at that date took the place of the garden, and one tree, still surviving, now bears fair fruit. These results are not all due to a change in the seasons, and cannot be accounted for, for we have had wet and cold years, favorable to producing cracked and spotted fruit; but must be explained thus. It is dangerous to destroy the surface-roots and force the trees to seek their food in the damp, cold subsoil. Surface-roots should be encouraged, and their mutilation leads to crippling the trees, promotes disease, in fact is destructive both to the trees and their fruit.

Twenty dwarf pears were planted in a garden, which was deeply cultivated, and only three survive. Of fifty trees planted in the same garden, at the same time, and receiving shallow culture, but few have died. There is only one fact in this connection, that renders this experiment indecisive.

The fifty trees were mostly of those varieties, as the Louise Bonne and Vicar of Winkfield, that thrive and endure as dwarfs, while the twenty trees were early kinds that have not established a reputation for succeeding as dwarfs.

Animals of any kind cannot be safely allowed in orchards without watching. The surface-rooting of swine is good tillage for the trees, and they also destroy myriads of insects, but sometimes they bark the roots and trunks with a voracity bordering on insanity. Sheep, usually harmless, sometimes will rub against the trees, or bite the bark, even when the trees are of considerable size; and when the habit is once acquired, it is apt to remain with the individuals of the flock. Calves, sometimes harmless, are at others the most destructive of animals. A dozen trees may be barked in a day when they begin the attack. Colts have sometimes shown the same propensity. Yet pasturage is better than mowing. The lush growth of June, suddenly removed, followed by the heat of July, is an extreme change. The grass forms a harbor for mice, that in the winter often prove destructive to young orchards.

Training and pruning the trees should begin at the beginning. Avoid forked trees in the selection, and by judicious training, prevent the formation of such a head, either where the trees limb out, or among the branches. These forks split down when the limbs are loaded with fruit, or ice and snow, and form a favorite refuge for insects. Some trees grow upward, as the Northern Spy, and others downward from the point of limbing, and we should remember these peculiarities in allowing the head to form. Four to six feet from the ground is a good height for the springing of the branches. If too high, the fruit cannot be readily gathered, and suffers more in falling, and the trees are more rocked by the winds, and the trunk and roots fail of a certain degree of healthful shelter.

If too low, they are in the way of fruit-gathering, and exposed to be broken by animals. The fruit, too, upon the lower limbs, is mildewed and poorly ripened from want of fresh air. Very little pruning is advised. Buds starting in the wrong place should be rubbed off at any time, and at least once a year the trees should be carefully examined, and all surplus wood removed, and such limbs as throw the head out of balance should be shortened in or cut away entirely.

Surplus wood means all sprouts that spring up at the base of the tree, or on the trunk; all water-sprouts that infest the branches; all ingrowing or crossing limbs, and those that become feeble from want of light and air, and all dead wood. Limbs that are cracked or broken by storms, or other causes, should also be cut off. Now, this is more in the enumeration than in the reality. Most of the advocates of non-pruning will go thus far, and admit that so much is right and proper; but their principles lead them to the neglect of practice,—resulting in forked trees, choked with water-sprouts at the base and among the branches, with decaying wood, keeping open sores to impede the vigor and destroy the vitality of the trees, and to interfere with the gathering of the fruit. An example of a vigorous, open grower is taken to show how well a tree will do without pruning; and, indeed, it makes a pretty good showing by the side of some other variety, even with the best of training, for its short wood, backward growth, and choked branches, can hardly be shaped so as to compete with the natural growth of the other. With regular annual pruning, the sap-sprouts will give little trouble. It is when, after years of neglect, that trees receive a "good, thorough pruning," that these are produced. Unless they are cut off promptly, they take the sap from the bearing branches, and they are impoverished. Sometimes the head of an old tree may be renewed by encouraging a few of these vigorous shoots, and cutting off the long arms, thus forming a new head. As soon as they get proper maturity, they will bear fruit, the same as grafts would do, and we have as it were a young tree on an old trunk.

June is admitted to be the best month, but few farmers will prune in June. We take the mild days in winter for pruning. We take mild days, because pruning is a nice operation, and, to do it well, it must be done carefully. Bad pruning may may be worse than no pruning. Cut the limbs off closely and smooth, yet not too close. There is often a swelling at the base of a limb of twice the diameter of the limb. We would not cut into the swelling, as the wound would be much larger. If it is very cold, the wounds will be rough, and the edges uneven and bruised. If delayed till spring, the sap is liable to run out, shown by a black stripe down the tree, and the wounds do not heal in a healthy manner. To settle the question as to the best time for pruning, we have in progress an experiment. From a thrifty young orchard we cut off a few limbs, of one or two inches in diameter, each month, marking the month. It is too early as yet to report any results.

For several years there have been alternate seasons of plenty and scarcity of apples. Some few farms have been exceptions to the rule, and have produced fair crops each year, the money returns being much better in the so-called barren years. We are the fortunate possessor of such orchards; but if urged to give a reason for this result, we can only say, "Not prepared." All we know about it is, we have young, vigorous trees, planted in different exposures, and receiving their fertilization at different periods of the year, and in different years, and a large number of varieties. Some of these rarely bear, except in the even or abundant years. The others bear as well, or better, in what are called the barren years, which are now the odd years. We have taken no special pains with this object in view. We believe that by picking off the blossoms regularly from a young orchard in the even years, and allowing it to bear only in the odd years, we may do something to encourage this habit in our trees, and we shall do it in one recently planted.

Local hail-storms seem to have been the means of changing the habit of bearing, in some orchards, from the even to the odd years. Whether it was merely the destruction of the young fruit, or, in addition, the checking of the circulation by the bruising of the bark and the stripping off the leaves, we cannot tell. This much we know, that the free growth of wood is not conducive to fruitfulness. Any cause that checks this, whether it be borers at the root, ice-storms bending the boughs but not breaking them, a crooked or bruised trunk, encourages the formation of fruit-buds, and, the other conditions being favorable, we have the fruit. The frequent occurrence of illustrations of this result renders any special proofs unnecessary. They are familiar in the experience of every fruit-culturist.

I will not attempt to discuss the various diseases to which our fruit-trees and fruits are subject, or the noxious insects that infest them. Some of the former are well understood, and may be successfully avoided, and most of the latter can be controlled by simple and well-known devices. It inures to the benefit of the intelligent cultivator that choice fruits require skilful care both in their propagation and management. It is not a haphazard business, but the reward is for the persevering, the painstaking, for those who have the faculty for fruit-culture. While all are fond of good fruit, but few succeed in a marked degree. Not only must the farmer himself have the skill, but all the laborers employed must get a tolerable knowledge, or they will wreck the best laid plans. We would not discourage any one who desires to raise good fruit; for it can be done, and here in New England, with the same degree of skill that in Massachusetts is required to raise good crops, or breed good cattle. Trees, as requiring a longer time to grow and mature fruit, need more patience and a little more enthusiasm to bridge over some disappointments and failures.

We pass now to the gathering and preservation of fruit. Summer apples, peaches, and plums should ripen fully on the trees. They may ripen and improve after they are gathered, but will not gain as they would upon the trees. Pears improve by house-ripening, and sometimes when blown off half-grown may be ripened up to a degree of color and flavor they would never have attained on the trees.

Winter apples and pears should hang as late as the risk of frosts and storms will allow. For this latitude it is not safe to trust them later than the 10th of October, though usually they will not take any harm before November. A slight freezing does not hurt them, provided they are left undisturbed while frozen. Yet that degree of frost which leaves no apparent effects on the fruit, still in some degree changes its nature, so as to make it not less palatable but less wholesome, less agreeing with some persons. From the perfect healthfulness of sound fruit, there is every degree of injury arising from eating frozen fruit, down to that misery which afflicts the school-boy who has gorged himself on frozen-thawed apples. A little caution will save us here from much inconvenience, and the complaints against fruits are too often derived from experience with such damaged specimens.

Summer apples may be allowed to drop, or be gently shaken from the trees on to a mat of soft grass, or a mulch of fine hay or straw. Fruit for keeping must be carefully *hand-picked*, and when large and fine, must be handled as tenderly as eggs. When gathered, apples may be safely placed directly in the barrels where they are to remain, if they are sorted by a careful hand; another way is to carry them in baskets to the fruit-house, or a clean barn-floor, which makes a very good autumn fruit-room, and allow them to remain in heaps till sold or danger of frost requires their removal to the cellar.

We adopt both methods. For our own use, the apples are placed, when picked, of course in a dry day, in barrels in the field and carried in a cart to the barn-floor, or some other clean out-building, where they remain till in danger of freezing, when they are carried to the cellar, which has been cooled down as much as possible by keeping windows and doors open. The barrels are not headed up, but placed in two tiers, the upper, the earlier sorts, forming a cover for the later keepers.

We use the different sorts when the season of their maturity arrives. We seldom have occasion to pick over a barrel, except with late keepers; perhaps in April or May. We keep the cellar as cool as possible and not freeze. It is usually wet or damp,—more or less water flowing through it. No onions, turnips, cabbages, or other fragrant vegetables are allowed in it; kerosene oil and allied articles are also excluded. Fruit is almost as susceptible to influence from odors—losing its own peculiar and delicate aroma and absorbing that of other substances—as cream and butter, the most delicate and sensitive of all articles of food. It cannot be kept in a common house cellar, with vegetables, without acquiring an artificial taste. A mouldy barrel will as surely communicate its odor to the apples as will a musty cider-cask to its contents.

We keep in our cellar the Fameuse, or Snow apple, in perfection till December or January, the Greening and Seek-no-further till February or March, and the Russets till new apples crowd them out. True, we lose a large per cent. in June, as soon as warm weather really sets in, but this does not amount to much, for a small stock answers all demands at that season, as we do not need many apples after strawberries come.

Apples should remain in the cellar till the day they are to be eaten. Then the glow of an open fire,—warming best brings out the peculiar aroma or flavor of each, and fills their plump skins with generous juice. Placed upon the well-swept hearth, they absorb the life-giving heat, bursting to reveal their treasured riches. It is here we find the poetry, in the juice of this homely, that is, homelike, fruit. The credit is due to our youthful friend of ennobling in poetry so humble a subject.

> "Poetry, poetry everywhere!
> You breathe it in the summer air;
> You see it in the green wild woods;
> It nestles in the first spring buds;
> You find it in the primrose rare;
> 'Tis in the apple-blossom fair;
> It smiles in maidens and in youths;
> You taste it in the apple-juice."

Pears should be kept cool—not freezing cold—till the season of their maturity arrives; then placed in the dark, in a warm room, for a few days, to ripen (they will rot without ripening in the cold),—best wrapped in a flannel blanket. A winter pear, brought into a warm room with a Duchess, in October, will mellow up; but there will linger about it a certain smack of greenness which will disappear if kept there till December.

Many of our farmers and their families have yet to learn the luxury of a dish of well-ripened Winter Nelis or Lawrence pears in December. Winter loses half its terrors when we can secure luxuries like these, that equal any of the melting fruits of autumn, the hearty relish and the leisure to enjoy being added.

The farmer who neglects to provide for himself and his family a succession of choice fruits for the year, each crowding upon the others, with no gaping intervals of dearth, neglects the privileges of his birthright, and no wonder that his children desert the old farm with no feeling of regret, for it is to them a scene of privations rather than of enjoyments, for they share the hard work and have none of the rewards skilful industry should bestow.

Mr. KINNEY of Worcester. You say you carefully pick up your apples, and then take them to your cellar in a cart. What do you mean by that?

Mr. GOLD. I find no way of transporting apples more safely than in baskets placed in a common ox-cart carefully driven. Sometimes they are taken in a wagon with springs; but that jolts them quite as much as a cart. A part of the load is borne on the necks of the cattle. I do not empty them into the body of the cart, and take them out again in the baskets. It is very easy to have as many baskets as we can set in the cart, and duplicate them, so that we transport them in that way. Most of our fields are such that a cart is the most ready means of transportation. We can shin around the rocks better with that than with any other vehicle, and we have a great deal of it to do. I have found no way to transport them, with less bruises, than that.

QUESTION. How many years do you plough round your trees, after they are set out?

Mr. GOLD. I have left that open, to be decided by circumstances. If the field is anything of a side-hill, the ploughing cannot be continued, as I said, any length of time, without great detriment to the soil, from its washing away. As soon as the vegetable matter in the turf, that holds the earth together, is decayed, it will wash, so as to prove fatal to the fertility of the soil. If it is level ground, where there can be no washing, there would seem to be no objection to culture for a number of years,—encouraging the growth of roots near the surface, however.

QUESTION. When it has been seeded down, can it be cultivated again?

Mr. GOLD. I should prefer the practice of top-dressing, and keeping up the fertility in that way, to ploughing again. As I remarked, ploughing gives a temporary start to the trees, usually; but it is merely temporary, and then they are worse for it than before.

QUESTION. You spoke of the varieties of apples you would select. I would like to ask what the nature of your soil is, where you have these varieties?

Mr. GOLD. Well, sir, we are on the southern limit of the Green Mountain range. It is what we call a loamy soil. It is well adapted to grass, grain, and the natural forest-trees,—the hickory, the oak and the chestnut, principally; and the natural wild bushes are the blackberry and the whortleberry. There is an abundance of lime in the soil, although we do not have limestone. It is the *débris* of the limestone region north of us—Berkshire and that section—that furnishes us with this lime. Ours is a granite formation.

Question. Have you ever had any experience in root-pruning trees, to bring them into bearing? I have known orchards that had not borne for a number of years—when there seemed to be no reason why they should not bear—that have been brought into bearing by severe root-pruning, and then, by fertilizing, they have been kept along a great many years.

Mr. Gold. I have never had occasion to resort to that myself, but I have advised it. My daughter, who resides in Indiana, has reported to me some fine pear-trees, which have grown to be very large, but which have failed to bear, and I have instructed her to have them thoroughly root-pruned, with the expectation that it will secure some fruit.

Mr. ——. I think you said you did not head your apples. I always head mine, as soon they become thoroughly dry. If I were going to put Greenings into the cellar, I should head them as soon as dry, and never open them until I wanted to use them. That has been my practice, and I never have had any trouble.

Mr. Gold. I remarked that I did not head my apples up that I designed for use in the family. It saves the trouble of heading and unheading them; and then my men are obliged to move the barrels with a little more care, when they are not headed, than when they are. I set one barrel on top of another, and that serves to exclude the air from the lower barrel. There is no objection to heading the barrels up, that I know of, if anybody wants to keep them in that way.

Question. Do not Western apples keep better than ours?

Mr. Gold. As a general rule, I think they have that reputation. They are picked quite early, and before the fullest maturity, and the apples that are shipped to this market grow in quite as northern a latitude, or a little further north, than we are. That, also, has a tendency to make them more enduring.

Question. I would like to ask whether fruit keeps best in a moist or a cool and dry cellar?

Mr. Gold. I have never had any experience with a dry and cool cellar. It is an impossibility, in our locality, to get a dry cellar, unless you have a furnace in it. The nature of the soil is such that the water rises up from below, and you must have a drain to let the water run off from your cellar. That is the rule, in nine cases out of ten, with cellars in our part of the State of Connecticut.

Mr. Ware of Marblehead. I will say, that I have been in the habit of growing apples, more or less, all my lifetime, and that my cellar is dry. It has a cement floor, and no moisture whatever comes from the earth. I have kept the "Kilham Hill," which is a fall apple, in that cellar all winter, and carried it to market in April, in perfect condition. It is well known that that apple, when it arrives at a degree of mellowness, turns mealy, and becomes of little or no value; but, as I say, I have kept them until April and carried them to market in perfectly good condition, without any mellowness whatever. My cellar is arranged especially for the keeping of fruit, and I had in view thorough ventilation. There is a window on two sides, so that in a suitable temperature I can open the windows and thoroughly ventilate it. If the weather is warm and damp, I then shut the windows and exclude that kind of air, keeping out dampness, and keeping the temperature as cool as possible in the winter,—very near the freezing point.

Question. Do you head your apples in?

Mr. Ware. No, sir. As a matter of convenience, for the purpose of stowing a large quantity in a small space, I have had bins made that will hold from fifty to seventy-five barrels each. They are made about two feet and a half deep,—about the depth of a flour barrel,—and when I harvest my apples, I pick them carefully by hand, pour them into barrels carefully, and take them in spring wagons to the cellar, and pour them carefully out of the barrels into the bins,—not pouring them from the top down, but putting the barrel down on the side, and tipping them out very carefully. In that way, apples can be poured from a barrel without bruising; and in order to have apples keep, it is necessary that they should not be bruised. Therefore, I have them handled as carefully as possible, and put them in these bins, and they keep remarkably well.

Mr. Howe of Shrewsbury. I rise to ask a question, but before doing so, I will state a little experience in regard to the treatment of apples. Some years ago, I put four barrels of apples in the extreme northerly corner of my cellar. I selected them with great care, and did not allow a worm-hole or a knurly place in one of them. When I put them up, apples were worth about a dollar a barrel. Somewhere from the first to the middle of January, a gentleman from Northborough, being in town, came to me and asked me if I had any apples to sell. I told him I had put up some barrels very nicely, but I couldn't tell in what condition they were. He said he would go and see them. So I went into the cellar, and I turned the barrels over,—they were setting on their heads. It was an extremely cold time, and I found that they rattled; in other words, they were very much frozen. Said he, "I don't want them." Said I, "Very well." I turned them back, and they stayed there until about the first day of April, and the same man came to me and wanted to know if I had any apples to sell. I told him I didn't know whether I had any or not; I had four or five barrels in the cellar that I had not looked at, and what condition they were in, I could not tell. Apples were worth then some $2.50 a barrel. "Well," said he, "I will go and look at them." We went down cellar, and turned those same barrels over, and found them perfectly full. Says he, "I will look at them." I opened a barrel, and saw they looked very well. Said I, "There are four barrels, and you may have two of them for $2.50 a barrel, or I will pick them over, and you may have them for $2.75 a barrel. Says he, "I will take them at $2.50." He told me afterwards that he made money by taking them as they were, for there was not more than a peck of apples in the two barrels that were not perfectly sound. That is my experience with apples.

Now, I simply want to make an inquiry in regard to trees. I have spent considerable money on pear-trees, and I have spent considerable money on Western trees. Those Western trees looked very nice when I set them out, but the trunks would not grow. Sprouts came up from the roots, which I cut off two or three years, to let the original trunk grow, but the trunk did not grow. I have some half-dozen trees, where I cut the trunks off, and let the sprouts grow, and handsomer trees, of two or three years' growth, there are not on the place, —and I have some forty or fifty pear-trees. The question I want to ask is, Why the sprout will grow when the trunk will not grow? I can show you trees, in good bearing condition, the original trunks of which are not much bigger than my thumb, and the sprouts are as big as my wrist. That has been my experience in buying Western trees. I will state, further, that I bought some trees of Mr. Strong, at Brighton, some years ago, and those trees went right along, the sprouts were cut off, and I have the original trees.

Mr. GOLD. That would appear to be a pretty strong argument in favor of purchasing home-grown trees. There is a little dispute between Western nurserymen and our own nurserymen here in New England, about the comparative value of Western-grown and native-grown trees. There have been a great many cases where the trees seemed to need to be acclimatized before they would grow in our soil, and the case the gentleman names would seem to be one of that kind. The roots were sufficiently vigorous to make a good sprout grow, but the change between their previous location, and the one in which they were planted, was too great for the trunks; the circulation in the stem was checked, and they became, what we call, "hide-bound." Such trees are often renewed by cutting back vigorously,—cutting back half the top, until you come to a vigorous bud; or, as this gentleman has found it necessary to do, cutting clean back to the root. This is the only explanation I can give of it, and, perhaps, it is not the true one.

Mr. HOWE. I would say, as far as my experience goes,—and it extends over a period of some ten or fifteen years,—I would advise every gentleman who purchases trees, to pay fifty, seventy-five, or a hundred and fifty per cent. more for trees that have been raised on the soil of New England, rather than invest their money in Western trees. I presume there are gentlemen who have succeeded with Western trees. It is well known to some gentlemen here that I live on a hill. The soil is remarkably good. It is well adapted to the growth of anything,—apples, pears, peaches, or anything else. But, as the result of my experience, I advise any gentleman who is about to purchase trees, to be sure to procure those that were matured in New England soil, on New England roots.

Mr. Ware. I do not feel prepared to answer the question that has been propounded to my own satisfaction; but I will state one fact, which, perhaps, may draw out the information desired, because this is rather an important question. I remember that my father—whose advice and instruction in regard to agriculture and orchard-culture I have ever found valuable—said, "Never graft a sprout that comes up from the root of a tree, for it will not make a good tree, and it will continue to throw up sprouts, instead of throwing its strength into the graft that you put in." Now, it has occurred to me, whether or no the gentleman's trees, that he has spoken of, may not have been grafted upon sprouts that had grown up from the roots of pear-trees. I know that nurserymen—and there are some here present—will say, that it would be foolish to do such a thing as that, because it is so easy to get stalks to graft into. That is true; but there are times—I have seen them myself—when there have been such thrifty and vigorous sprouts coming up under the trees, that the temptation has been very great to take those sprouts and set them out, and graft them, or graft them in the place where they were, thinking to gain time by it. Whether or no those trees were propagated in that way, the gentleman may be unable to answer; but perhaps some person present may have had experience in that direction, and, if so, it might be the means of establishing a certain principle, or fact, if it can be so established.

Mr. Howe. Of course, I cannot answer the question, whether they were, or were not, grafted on sprouts; but I had those trees from a gentleman in my own neighborhood, a man with whom I was well acquainted, who told me—and, of course, I had no reason to doubt it—that he went himself and selected those trees, and knew that they were budded from the root. Some of them were dwarfs and some standards, and I can show you to-day, on my place, the dwarfs and the standards, and it has been invariably the case, that those trees that have been purchased from Western agents have failed in the same way. I will say, that those trees that have come from those sprouts have proved true to their name, as far as I could remember; or, in other words, they proved to be very fine pears. I cannot remember all their names, because they have such long names for some pears, that I would rather taste them than remember their names, in order to test the quality. I can show you some dozen trees that I bought for Mr. Sumner, who lived, in the summer, on the place where I now reside, and set them out myself, and there is not one original stock among them, except four or five Bartletts, which are about as large as my thumb, and the sprouts are much larger, and grow much more vigorously. I have not cut them off. Mr. Sumner told me to cut them off last spring; but I said, "Let them grow another season. By digging around them, and manuring them, they may be made to do something." I find that it would have been far preferable to have cut those stocks off two or three years ago. He would have had very nice and vigorous trees now.

Mr. Gold. My opinion in regard to the relative value of New England and Western trees is expressed pretty well by the proportion in which I planted the two kinds for an orchard, a year ago. I planted three hundred trees, and I got a dozen from an agent from the West; the rest I got from a Connecticut nursery. I wanted to try the experiment, but I did not care to try it in any other proportions than that.

Mr. Goodnow of Princeton. In the region of country where I reside, we are overrun with cider-apples, and the question is, what to do with them. I have fed them, in former years, to hogs. This year I have fed them largely to stock. I have also fed them to sheep. The question with me is, whether it will do to feed them to milch cows. I was offered eight cents a bushel for them this year, if I would cart them four miles. I could not see any great profit in that. And if we undertake to make cider, it will not bring the cost of the barrel.

Mr. Howe. A friend of mine has been feeding from twenty-five to fifty bushels of apples a day to his milch cows, and he told me he considered them worth more to make milk than potatoes, or even pumpkins, and he would rather have them than either. So if Mr. Goodnow can find that gentleman, he will perhaps find a purchaser who will give him more than eight cents a bushel for his apples.

Mr. PERRY of Worcester. It seems to me it is always a good thing to establish one fact before you go to another. Mr. Goodnow has asked a very sensible question in regard to feeding apples to milch cows. That question is one which interests most of us. I keep a large stock of cattle, I have a large quantity of cider-apples, and I have fed them to my cows regularly. I have given my cows about half a bushel a day, and I think that those apples are worth twelve cents a bushel, as we are selling milk now in this city.

QUESTION. How much do you get a quart for your milk?

Mr. PERRY. From six to eight cents. I presume back in the country, where they make milk into butter, they are not so valuable. But instead of selling apples at eight cents a bushel, I should give them to my cows, because they not only increase the quantity of milk, but they furnish nutriment for the cows, and of course they require less of other articles of food. So that, in my opinion, a bushel of apples is worth, in my location, from eight to fifteen cents, to feed to cattle.

Mr. HARLOW of West Boylston. I think, as my friend on my right has said, that it is well to settle one question before we pass to another. I would like, as the preachers say, to make a little personal application. We have the eminent authority of Prof. L. B. Arnold, in support of the proposition that apples are worth twelve and a half cents a bushel as food for cows; we have the opinion of the eminent gentleman from Connecticut, that they are worth nearly as much in his neighborhood; and we have also the opinion of one of the most sensible and level-headed farmers of Worcester County that they are worth as much as that, or more. This being the case, I would ask, in the name of good morals, why prostitute the farming interest of New England to the debasing manufacture of cider? When our apples can be devoted to a useful purpose, why should we lower our own calling, and degrade the communities in which we live, by making cider, to ruin our fellow-men?

Mr. Ware. The inquiry has been suggested to me, Why not graft the trees, and raise Baldwins, Greenings, and other choice varieties, and thus do away with this superabundance of cider-apples? I infer that they are the natural fruit. They may be refuse-apples from the orchards of good, grafted fruit. If so, that is another thing. But I got the impression that these cider-apples that have been spoken of, are native wild seedling apples, of little value, except for cider or feeding; and if the trees are not too old,—if they are young and vigorous trees,—why not graft them with good, nice fruit?

Mr. Hicks. I have no definite figures to give; but I will say that we make a little butter, and we have fed a bushel of apples a day to each of our cows for the last six weeks,—half a bushel at night and half a bushel in the morning, and the quality of the butter is better. I know that their feed has not been as good as it was previous to our feeding the apples, and I have no doubt that the butter is better,—its flavor is better. I am satisfied that apples not only increase the quantity of milk, but increase the quality also. I have no doubt of it in my own mind, from our little experiment. We have never fed them before, but made them into cider. This year, we could not make them into cider, because it was so far to a cider-mill, and cider was so cheap.

Mr. Ware has suggested grafting the trees. We have very few cider-apples on our place,—that is, natural fruit; but we find this year that apples are so cheap, we have to carry the very best to market, in order to get anything for them beyond the expense of cartage. Therefore, even if you graft your trees, and take the best care of them, you will have a certain quantity of fruit that it will be necessary to dispose of, in some way other than by the barrel, for eating and other purposes.

Mr. Goodnow. A large portion of my apples were grafted fruit. I have young orchards coming up, and I have also trees that my grandfather planted, which it is hardly possible to graft, and I must either take the fruit as it comes, or cut the trees down. I find this to be a fact, that apples that are ripe and mellow, are worth nearly double for my cows what half-ripe apples are worth. If that is of any benefit to any gentleman here, I am very happy to communicate it.

Mr. Draper of Worcester. The number of varieties to be cultivated, the gentleman (Mr. Gold) reduced to eight. Now, I think it is a matter of great importance to know, from the experience of gentlemen here, which are the best eight varieties for the market and for home consumption. He named a list for Connecticut. I should name, here in Central Massachusetts, perhaps another list. Of course we should hold on to the Baldwin; but we must all admit that the Baldwin is the cause of the glut in the market. I dare say that three-quarters of the apples grown by the gentlemen present here to-day are Baldwins, and they, unfortunately, bear on the even years. If one-third of the Baldwin trees were grafted with some other sorts, to reduce the glut in this one variety, we should have less cause to complain of an overstocked market. Mr. Gold named, in his list, the Porter. I think gentlemen from Central Massachusetts would take exception to the Porter, and put in its place the Gravenstein, which was not mentioned by the gentleman. We found, last year, the Porter small in size, and imperfect. This year, we find it very fine, and well grown; but it has this serious drawback, —it is almost impossible to put the Porter into market without its showing signs of bruising; whereas the Gravenstein, when put on the market, is one of the most golden-colored, handsome fruits that we have. I should hope that a little time might be spent in naming the eight best varieties for farmers to plant in this section. I should put in my claim for the Gravenstein, as the head of the list, for the market.

Mr. VINCENT of Edgartown. One remark of the gentleman who has just taken his seat has brought to my mind a question which has attracted some attention in times past, —and that is, how to provide for the non-bearing trees. According to the best information I have,—and I would like to hear the opinion of farmers who have large orchards, as to whether it is a fact or not,—the Greening is the best variety for non-bearing years, because it does bear considerably every year.

Mr. WARE. It may be interesting to some here to know my experience in endeavoring to remedy the difficulty that arises from the non-bearing year of apples. That experience conflicts somewhat with that of the gentleman who has presented us with the very able essay. It is with regard to the cultivation of orchards. My orchards yield more apples, usually, in the even years than in the odd years, but we have a fair crop of apples in what are called the non-bearing, or odd years, and it brings, perhaps, twice as much money as the large crop does on the even years; and I attribute my success in raising apples the odd years to cultivation. I have always felt the necessity of manuring and cultivating an orchard as regularly and fully as I would cultivate for a crop of vegetables, or anything else. I keep my apple-orchard continually under cultivation. I do not plough very deep, but I never allow an orchard to remain in grass for more than a year or two, and to this constant cultivation, and constant supply of fertilizers, I attribute my success in raising a fair crop on the odd years. I have never taken any pains, in any other direction, by picking off the blossoms, etc. My orchard, at the present time, has been under cultivation, I should think, for twenty years, with hardly any intermission, —not more than a year or two at any time; and I give it a dressing of manure, if not every year, certainly every other year, but usually every year, and I think by that means I secure a fair crop of apples the odd years. If the ground is so shaded that nothing will grow, I am satisfied with raising nothing; but if the trees are not so large as to cover the ground fully, I raise, very frequently, fodder-corn. That is something very easily handled, and requires little labor. It is rather difficult to cultivate under apple-trees, on account of the limbs interfering somewhat with the work; but a crop of fodder-corn requires very little culture, and I have usually raised that. Sometimes, where the ground is not very much shaded, I plant squashes, and in any open space that is allowed between the trees, squashes will grow, and produce a good crop. Where the ground is very thickly shaded, there will be no crop; but I am satisfied with taking whatever grows, where the trees will admit sufficient sun to produce a crop. But where the ground is completely shaded, so that no crop will grow, I cultivate just the same. After putting in the plough, it is very easy to keep down the weeds with the harrow,—"scarifying," as we sometimes call it. It requires very little labor to keep the ground clear under the trees, where crops will not grow.

QUESTION. How far apart are your trees?

Mr. WARE. My trees are set out about forty feet apart, each way. I have a younger orchard where I set the trees nearer, thinking to experiment a little, but I am not satisfied with the experiment of setting trees nearer than about forty feet apart, each way.

QUESTION. How do you prevent your men from letting the whiffletree bark the trunks?

Mr. WARE. That is very difficult, but I give them a severe scolding every time; and when they bark a tree, I tell them to come and take a piece of skin off of my flesh, if it will give them any satisfaction. My trees are not barked much, but occasionally they get scraped a little. I prefer not to plough too near the trees, because a large tree has large roots, and as the roots grow in diameter they come quite near the surface, and if the plough is run very near a large tree, it is apt to injure those large roots, and therefore I object to it. Therefore, I tell my men to go far enough from the trees to prevent the whiffletree from striking them, and to avoid injuring the large roots. It is necessary sometimes to fork around a tree to prevent the grass from growing. It requires very little labor to do that.

Mr. FISHER of Fitchburg. Is it desirable, or can we raise small fruits in an orchard?

Mr. WARE. As far as my experience goes, they cannot be raised where it is shaded quite materially; but in a young orchard, when there is quite a space between the trees, small fruits may be cultivated to advantage.

Mr. GOLD. Some of the most successful currant-culture that I have seen has been in young orchards. The currant-bushes get past their bearing, and need to be removed before the trees get large enough to shade them or demand the whole strength of the soil. The slight shade that they receive from the young trees is favorable to the currants, and the culture of the ground which the currants require during the early growth of the trees, is favorable to the trees, and the two seem to work well mutually.

Mr. WARE. A gentleman has just whispered to me a question in regard to the method of planting orchards. He asks me whether or not my trees were in one body. That I consider a very important thing. My observation and experience convince me that a single row of trees set around a field by the walls, or an individual tree by itself, will not do as well in any respect as an orchard set out in rows of trees forty feet apart, if you please, more or less. The fruit that grows on a single row of trees, or on a single isolated tree, is usually very wormy, crabbed, knurly, and of inferior quality. And my observation is, that trees in that condition do not produce so good crops. My explanation of it is this: that in a given space there are a given number of insects, and enough of them will gather on a single row of trees, or on an isolated tree, to destroy perhaps the whole of the fruit growing on those trees; whereas, in the case of an orchard, the insects being distributed among so much more fruit, their mischief is less noticeable, and we have finer fruit. On my brother's farm, which adjoins mine, a single row of trees was set out and arrived at full maturity at the same time with an orchard adjoining. That single row of trees has been cut down as a nuisance, from the fact that the trees bore no fruit, or none of any value. I have seen a good many instances of that kind. On the farm where I was born, there was a single row of apple-trees that I remember from my boyhood up, that never produced any crop of fruit, while orchards in the neighborhood were loaded with handsome and good apples.

Mr. KINNEY of Worcester. I have a row of apple-trees that produce more fruit in even years than an entire orchard of three acres.

Mr. SEARS of Worcester. I have planted apple-trees around stone walls, and the like of that, and for the last six years they have produced, in the bearing years, more than double what my orchard has, where I have the trees set in regular rows, and cultivated with as much care as has usually been taken with such orchards. I have in mind some trees that were set out twenty-five years ago, of the Greening variety, (which have not been great bearers with us here), and this year, and two years ago, I picked from five to six barrels from these Greenings when those in the orchard did not bear more than half or two-thirds as much.

Mr. WARNER of Sunderland. I suppose that apple-growing can only be done successfully on poor land. It would never pay to devote the land on Connecticut River to the raising of apples. Where land is worth three or four hundred dollars an acre, you cannot well afford to set out apple-trees. On poor land, you might find it profitable to raise apples, even if you could get only twelve cents a bushel.

The apple-trees which grow with us are the Baldwin, Greening, Roxbury Russet, Nonsuch, Gravenstein, and Porter. I have never seen any other variety that was sure to produce a good, handsome, and well-ripened crop. The Nonsuch, if it can be ripened, is one of the best fruits in the fall. I do not know any apple that will bring so good a price in the market as the Gravenstein, but I question whether it can be grown well on our land. Perhaps the Northern Spy can be grown in Connecticut; I do not believe it can be grown well and thoroughly in Massachusetts. I do not believe that the Newtown Pippin, which is a very nice apple, and a successful one in some sections, can be grown here, and there are some varieties which do well in New York that are not adapted to Massachusetts. Therefore, if I had poor land, light soil, or side-hill that I could not cultivate, I should plant apple-trees.

Mr. W. C. STRONG of Brighton. I was very much interested in the suggestion of the essayist in regard to the quality of fruit. I believe it has a bearing upon the discussion just at this point. I think we are not by any means careful enough as to quality, and I think this will apply even to the apple. My impression is that Mr. Ware makes the culture of the apple profitable even now, and if he does, it is simply because he has a good quality of fruit. We have made it a rule for a long time to pick off half the crop of pears, but we go beyond that now. We say, "Pick off more than half," and when word is brought back that they have picked off more than half, we say, "Pick off all there are, and what is left will be sufficient." We do not thin our fruit nearly enough.

Now, in regard to the apple, I know that it will not pay to go round and pick off the common fruit, so that we may have a moderate crop, and so that we may have a crop every year. That will not pay. Can we devise any other method by which we can reduce the enormous crop, or equalize it, and raise the quality to such an extent that we can sell all our crop as a market fruit? I think it is true to-day that the great majority of our apple-orchards are neglected, and as a consequence, they are not making wood. They bear enormously in the fruit-bearing year; they bear all the crop they can stagger under; they exhaust themselves, and can neither make wood nor fruit-buds for the next year, and consequently, the next year they rest. If we can devise any means by which we can improve this crop, I believe we can make it profitable. Mr. Ware does it to some extent by manuring and cultivating, so that his trees have a steady and moderate growth, and while they are making this moderate growth, they are also making a fair amount of fruit-buds, so that they bear from year to year. I know that that is not the tendency of the Baldwin apple, but I think the facts are beginning to be sufficient for us to take the position that we can change the bearing year of the Baldwin. I think, if we follow this method of treatment, and try to keep at a moderate growth, with a moderate crop, we can equalize this fruit, and make it a profitable crop in New England. It is too bad that we should pronounce a fruit as valuable as the apple, and so well adapted as the apple is to New England, an unprofitable crop. I believe it may be made a profitable crop, if we will take more pains with it, if we will cultivate it better, and study to put our brains into this crop, which has been for the past years so much neglected.

Mr. MERRIFIELD of Worcester. The question which was asked by one gentleman in relation to his trees, has not been answered, nor has any attempt been made, I think, to answer it definitely. But I think it is an important question to people purchasing trees and transplanting them. I suppose it is well known to every horticulturist, that if he receives shrubs or trees, although the roots may be well packed in moss, and kept fresh, yet if the wood of the tree, plant or shrub becomes dry, so that it shrinks from the bark, the probability is that the tree or shrub, or whatever it is, will never grow. By cutting it down, possibly, he may get a tree from the root, but he will not be very likely to get a tree from the top, if it has been so treated. That, I think, is the difficulty with a great many trees that are purchased and set out. They are dead, or nearly so, before they are transplanted. There may be a feeble growth, and the tree may linger along for a few years, and then die. The trunk may throw out these sprouts to which reference has been made, and if they are allowed to grow, they may produce the same fruit that was grafted, because the sprout will be more likely to start above the point where the graft was inserted than below it.

Dr. FISHER of Fitchburg. I think the gentleman last up has touched upon a point which is the real explanation of the difficulty. I have had considerable experience in setting out home-grown trees and foreign trees,—trees from Western New York,—and I have found somewhat the same difficulties that one gentleman has spoken of. It seems to me that the trouble is not in the trees, or where they grow, but it is in the way the trees are treated when taken up, and the management afterwards. In the first place, we buy trees one, two, and three years from the bud. To begin with, you cannot take up an old tree with the same success that you can a young one. The general rule with nurserymen is to cut the roots a certain distance from the trunk, no matter whether the tree is young or old. You get about the same length of roots in an old tree that you get in a young one, but there is a vast difference in the character of the roots. In a yearling or two-year old tree, you are likely to get the whole system of roots, but if you get a three or four year old tree, the roots are cut off very short near the stem, and those trees dry up very easily. I think if we should go and see the trees lying around the nurseries, in sunny days, we should be likely to see where some of the trouble comes from. Then they are on the way from a week to ten days; then they are exposed, more or less, to sunshine, when we set them out, unless we are careful, and know what we are about; and then, worst of all, when they are set out, the whole of the top is left on. If that is not enough to kill a tree, it is because a tree has as many lives as a cat. I think the advice of the gentleman who read the essay was, to cut off a third of the top of a tree when you set it out. My advice is, buy young trees, and cut off seven-eighths of the top. If a tree has been out of the ground so long that the top is dry, I have no hesitation in cutting off the whole tree, because a single sprout, coming up from the bottom, above where it was budded, is worth more than a whole top which has been exposed until it has become dry. What I want to buy is, simply the roots, in perfection. I can make a top very fast, and just as I want it, whereas, the Western nurserymen do not make it as I want it. So much for that question.

Something has been said by Mr. Strong about the crop of apples. The difficulty is, it seems to me, that poor apples are too easily raised. There is the whole difficulty. It is too easy to raise apples to make them valuable. There is an over-production of apples, and the result is just the same as it would be in the case of anything else. Suppose we should make ten times as many shoes as the community can wear, have we any right to find fault with the shoes because we cannot sell them at a profit? If we produce more apples than the community can consume, by eating and cooking, we have no right to find fault with the apples if we cannot find a market for them. We can and must produce something else.

Now, there is no doubt that by cultivating our apples we can make them much more valuable, and those people who do will find their account in it. The Messrs. Clapp of Dorchester have practised that system for some years, and I have no doubt it pays. I have no doubt it will pay anybody. I know it pays with pears. The custom is with some growers to throw out one-half or two-thirds of the crop. The Bartlett will bear thinning just as much as the Baldwin. There are certain varieties of apple which ought to be thinned; for instance, the Gravenstein. It is a very valuable apple, and yet I would not recommend farmers to go into it. Poor Gravensteins are just as poor as poor Baldwins; it is only the finest that pay. I have had Gravensteins this year that were sold in the market for five dollars a barrel, right by the side of other apples that could scarcely be given away. Those were very handsome, very large, and perfect. If we should all go to growing Gravenstein apples (I have no fears that we shall), it would probably reduce the price of that variety as low as the Baldwins. But the Gravenstein will not grow without care. If you should neglect it as you do the Baldwin, it would be a very poor apple. The same is true of many other varieties. They are only valuable when grown under favorable circumstances, but if neglected, the fruit is very poor. My advice would be to throw away all your poor apples, and raise only good ones. If I were afflicted with them, and could not sell them, I would feed them out. I have no doubt that they would make milk, butter, and cheese. But I can tell you one thing: Baldwin apples fed out before they are ripe, I don't think are worth two cents a bushels. I would feed them out when they mature, when they contain the greatest amount of sugar; when you would eat them yourselves they are fit for cattle, and when you would not eat them they are not. I know that, in the case of the pear. I feed a great many Bartletts to my dairy cows, and I find the Bartlett pears, falling early, are good for nothing for a cow; they dry her up. When they begin to taste like pears, when they begin to be juicy and sweet, when a man likes to get a bite out of one side for himself, then the cows will like them; and when they become mature, they will increase enormously the production of milk, butter, and cheese. It is the same with apples as with pears. You may feed fall apples to your cows in the fall, and they will like them, and produce a greater amount of milk and butter. If you want to feed Baldwins, take them when they are just ready to eat; and the time to eat any apple is fifteen minutes before it begins to decay. It is not fit to eat until it begins to decay, because it begins to decay as soon as it is ripe. That is the time when it reaches perfection, and then it is just fit to eat. Now, don't feed out apples next spring with the expectation that they are going to make milk as they did in November.

Mr. Kinney. There seems to be one point which is not settled, which I am very anxious to see settled, if it can be intelligently, and that is in regard to the production of a crop of apples on the odd years. The Hon. J. F. C. Hyde, last year or the year before, you will recollect, gave us a very fine address upon apples, in which he spoke of visiting an orchard that he had heard had been brought into bearing on the odd years by some artificial means, and the man made the business of raising apples very profitable. He said the man did not like to tell him how he did it, and all he could find out about it was, that when the trees were small and he could get at them, he picked the blossoms off in the even year, and that brought them into bearing on the odd year, and they continued to bear in the years when apples were scarce and brought a high price: If that is the case, those men who are setting out young orchards can very easily bring their trees into bearing in the odd years, when they can make their crop profitable. Mr. Strong thinks it will be difficult to pick off fruit or blossoms, but if it is done while the trees are young, I do not see any difficulty in doing it, any more than with pears or any other small tree. I am confident that will produce the result of a good crop of apples, when they will bring a good price.

Mr. Hersey of Hingham. I wish to state a fact which has come to my knowledge in regard to this subject of changing the apple-bearing year. An acquaintance of mine, some years ago, having two apple-trees which bore on the even years, felt very desirous of changing the year of one of them, as he had only these two trees. They were large trees, bearing about three barrels each. As he was a man of leisure, he did not think much of his time, and having read in some newspaper this fact (if it be a fact), which has been stated here, that by picking off the fruit-buds the bearing year could be changed, he climbed his tree and crawled over the limbs, and picked off every blossom on the tree, determined to make a sure thing of it. Well, the result was, he said, that the tree did not bear that year; the next year, it did not bear any more than the other; but when it came the even year, he had his six barrels of apples. You have this fact for what it is worth. I know it to be a fact, as well as I know anything, because it was a very particular friend of mine, whose word I have no doubt of. I think that this statement, which has been the rounds of our papers so many times, cannot be relied upon. I believe that we must look for some other plan to change the bearing year. In fact, as soon as the fruit begins to form, I think gentlemen well know that the fruit-buds are prepared for another year, and if they are allowed to come out and blossom, the strength of the tree, for the time being, is in a great measure spent, so that, if you pick off the blossoms, it is in no condition to throw out another set of fruit-buds for the next year.

Now that I am up, I want to say a word about the cause of the death of many of our trees which we transplant. I believe that many young trees die in consequence of the trunks being exposed to the hot sun of this climate. I believe that a great mistake is made by our nurserymen in trimming off all the lateral shoots, and thus stripping the trunk of that protection which nature intended for it. My way has always been to allow the lateral shoots to remain far enough to shade the trunk with their leaves, cutting the lateral shoots back within a few inches of the buds, and allowing them to continue there until the tree is large enough to protect its trunk. In that way, I have never lost a tree in transplanting. I would not give two cents apiece for apple-trees that have all the lateral shoots taken off from the top.

Mr. HILLARD. I would like to know whether scions taken from trees that bear the odd years, would be any more likely to produce fruit in odd years, than scions taken from trees that bear on even years.

Dr. FISHER. I don't believe I know; in fact, I *know* I don't. I have heard it stated by gentlemen that they have produced the result in this way: that they grafted one set of trees one year, and another set the next year, and so on, setting out the trees and grafting them afterwards; and they state that they come into bearing alternately; those grafted one year come into bearing one year, and those grafted the next year come into bearing the next year. But that I do not vouch for. I doubt if it is a question that can be very readily settled. I know one gentleman in an adjoining town who has a large crop of apples the odd years; he had some three hundred barrels of Baldwins last year, which he sold for about $1,300. This year he has less. I asked him if he knew anything about it, and he said he did not. He told me they chose to bear so, and he had no objection. I have a number of Rhode Island Greening trees, and two or three of them have got into the habit of bearing the odd years, without any rhyme or reason. I never asked them to, or made any suggestion of the kind; but two or three of them bear the odd years, although they were all set at the same time.

Mr. Cheever of Boston. I want to reply, in part, to Mr. Hersey's story of the apple-trees, from which the blossoms were picked off. I don't know that I can explain it, but, if not, I may give a parallel case, which I explain in my own mind. In 1874, we had a full crop of apples. I had a Gravenstein tree that bloomed with the others, full. For experiment's sake, I had the blossoms all picked from that tree, expecting to get a full crop the next year. But the next year I did not get any. I will state this as the explanation, in part: that tree blossomed in 1875 as fully as it did the year before; the fruit set well, and the little apples grew for a time. But the year before, with our great crop of apples, we also matured a great crop of insects; and the next year, there being more blossoms on that tree than on any other one on the farm, all the insects that matured the year before went to that tree, as the only place they could go; and I could count twenty-five punctures to an apple. Of course they fell off. I think it is quite possible that other gentlemen have had similar experience.

Now, we may possibly change the bearing year of one tree, if there are no other trees in its vicinity; but, if we have orchards all around us that bore fruit the last year, and matured insects that lie in the ground, in the bark, or wherever it is their nature to lie, they will come out the next spring and attack this one tree, and we shall lose the fruit. There is the point of difficulty. If we are going to change the bearing year, we must take care of the insects matured the year before, and keep them out of the way of the crop on the odd year. We owe to the insects, more than to anything else, our large crops one year and small crops another,—to the insects, and to the habit of over-bearing that certain of our varieties have.

Mr. Moore of Concord. What did your tree do this year?

Mr. Cheever. That tree bore a fair crop again, as usual.

Mr. Moore. Perhaps there are no pear-orchards so good in Massachusetts as you will find in the little town of Revere, a town set off from Chelsea, close to the ocean; and those pear-orchards are, some of them, on reclaimed marsh-land. This marsh-land is almost a clay soil. I visited the orchard of Mr. Fenno of Revere,—which consists of some nine or ten acres,—in June, and also in September, and saw the whole method. He grows his trees in this way: this land is very wet, naturally, although there is an inclination to it, and it has been thrown up in beds,—that is, it has been ploughed, so that it is rounded up in beds, perhaps two rods and a half wide, and, in what would be the dead furrows, stone drains have been laid. These stone drains are not nearly as serviceable as tiles, and it is not economy to lay them; as I suggested to Mr. Fenno, it would be a great deal better to put in tile drains. In the centre of those ridges is a strip of ground, about ten feet wide, in which the trees are set. You will observe that the trees, by that method, are very thick in the row, one way,—I cannot say how thick, but there is a wide space between the rows. Those trees, on that land, he tells me, have not been manured for ten years, and were not manured to any great extent when they were planted. How they hold their vigor, is more than I can say,—perhaps it is partly owing to the management. They are mostly on pear-roots, and, being exposed to the wind,—Chelsea Beach being a little way off,—they are kept headed down very low. I should say, from one-half to two-thirds of the new growth is cut from those trees every year. Then the pears are thinned; and although almost every tree, when I was there in September, had a large crop, there were no poor pears on those trees, of any consequence. He told me that three-quarters of them had been picked off. He is very careful, when thinning pears, never to allow two to grow together, because, as any grower will tell you, if you leave two or three pears in a bunch, if there is a worm in that vicinity, he will get in between those two pears, and spoil both of them. In this way, he raises nothing but perfect fruit, and has been enabled, to my certain knowledge, to get about double price, in Boston market, for more than two or three thousand bushels of pears this year. Mr. Fenno told me, last Saturday, that he had got for his Beurre Clairgeaus—which is a reasonably poor pear, one which I would not eat myself, but it sells in the market—an average of $4.50 a bushel. In quality, the Beurre Clairgeau is as good as Mr. Gold's Vicars, which are not good for anything, in my judgment. I would not have them. They are not good for cooking.

What surprised me in Mr. Fenno's case, was, that he could raise that fine fruit without manuring. I said to him, "While you raise very fine fruit without manure, I guess if you put on about a hundred cords, you would get very much finer." I think he has come to the conclusion that, perhaps, a little manure would do a great deal of good there. But I was perfectly astonished that he was able to raise pears, without any manure, fine enough to take first premiums almost every week from the Massachusetts Horticultural Society.

I have quite a number of pear-trees, and can raise ordinary fruit, but I have been exceedingly annoyed because I could not raise just as good as anybody else. What the reason was, I could not make out. I had manured the trees enough, I had taken good care of them, and I got so out of patience that I let the trees go, and made up my mind, some three or four years ago, that I would never set another pear-tree; I would have nothing to do with them. But since water has been introduced into the town, I have an abundance of water in my garden, which is a sandy loam, and use it as freely as I please, and I have been able, the last two years, to grow some fine pears, and beat some of these men. I had everything before, except water. I did not have water enough.

Something has been said about the poor trees that are sold, and all that. Trees are largely sold here now by men purporting to be the agents of Western nurseries, or Western New York nurseries. Well, to begin with, you may set it down as a fact that not many of them are agents; they are simply speculators, doing business on their own account. I have watched their course pretty carefully, and I think you may set down nine-tenths of them as scoundrels, and the other tenth will bear looking after pretty sharply. If you want any trees, go to an honest, square nurseryman, and pay a fair price for them. You will get them cheaper and better than you can of these men. As Dr. Fisher says, buy young trees. Buy of a man who is located somewhere, and to whom you can go for redress, if he sells you poor trees. You will never see one of these speculators around in your vicinity again, after he has cheated you and your neighbors once.

Mr. Vincent. In regard to this matter of transplanting trees, I think a great deal of the trouble arises from the fact that the trees are left out of the ground too long before they are reset, and the roots, which are cut off very short, die. Now, I would say to every farmer, if you cannot get trees of a near neighbor, have a nursery of your own and raise your own trees, and when you take them out, put them into the ground again as soon as you can.

Now, a word or two in reference to the remarks of Mr. Moore, in regard to the raising of pears on that salt marsh. The thought occurs to me, whether a certain amount of salt is not adapted to the pear, and productive of its growth; and it occurs to me now there are two gentlemen in Martha's Vineyard who have succeeded better than ever before by applying a certain amount of slacked lime and salt, using about one-third as much salt as lime. By this application, they have succeeded wonderfully in the improvement of their pears. The remarks of Mr. Moore on that point confirm me in the opinion that it is an excellent thing. I hope you will make a trial of lime and salt, and see if your pears are not improved in quantity and quality. I have made a little beginning, acting upon the teachings of these gentlemen, and I certainly have had better fruit this year, on the few trees I cultivate, than ever before. I am going to keep on, and make a full trial of that matter.

Mr. Perry. I want to say a single word in regard to my experience in taking grafts from trees that bore the odd year. My brother and I, when we were little fellows, started a nursery. We had a large number of Baldwin trees, all but one or two of which bore the even years. We started an orchard from the seed, and when the little trees got to be one year old, we grafted them, taking the grafts from a tree that bore the odd years. We were small boys then, and we reasoned that if we did that, we should have trees that would bear the odd year. But the result did not prove that we were right in our conjecture. I think that we raised on the old place this year not far from a thousand barrels of Baldwins, and they came mostly from trees grafted from that tree that bore the odd years. We have also grafted over some twenty or twenty-five old trees in the same way, taking grafts from the same tree, but we never succeeded in raising many Baldwins the odd years.

Mr. CHAPIN of Worcester. I want to ask one question in regard to the pear. I want to know if there is any remedy for the blight, except amputation? What I mean by the pear blight is, a limb or limbs will grow black, and there will be an apparent wilting of the bark. It is well known here, and I suppose gentlemen from other parts of the State must have it in their orchards. I have seen pears apparently in good condition at the end of a limb, but the leaves on the limb were black, and there was this shrinking of the bark. The only remedy I have found was to cut off the limb where there was no indication of the disease.

The CHAIRMAN. The Chair will state that he never heard of any other.

Mr. HARRISON. I want simply to say that I budded eighty trees of the Baldwin variety from a tree that bore the even years. The result was, that two-thirds of the eighty trees commenced to bear the odd year, and I felt as though I had made a strike in the right direction. I also budded eight of the Yellow Pearmain variety of apples, taking the buds from a tree that bore the even years. The result was, that four of them bore the odd year, and they have continued to do so up to the present time. Last year, I took some six or eight barrels off of those that bore the odd year. This year, they did not bear. The Baldwin trees have mostly changed, and I must say, I am glad of it, because, when I raise apples, I want to raise those of decent quality. The fact is, that the trees that bear the odd year take all the worms from the territory around me, and the fruit is really almost worthless. Unless we can change the trees over a large territory, it seems to me it is hardly desirable for us to have our trees bear the odd years, for certainly we should have to take all the worms, and I would about as lief have no apples as to have them full of worms.

Mr. KINNEY. There is one little point, which, it seems to me, has not been illustrated satisfactorily, and that is in regard to producing fruit from fruit-buds. We are told that grafts taken from odd-year bearers do not bear regularly on the odd years. Is there not something in the age of the graft, and the time when it begins to bear? If it bears a good crop of fruit the first time, it will not be likely to bear the next year. It will bear alternately. The graft may bear when it is three years old, and again when it is five, and so on. If the graft is taken from a tree that bears on the even years, if it begins to bear when it is three years old, it will bear, whether it is the odd or even year, and so on; and so with those put in that are taken from odd-year bearers. There may be something in that. Gentlemen who have practised grafting perhaps can tell.

Adjourned to seven o'clock.

Evening Session.

The meeting was called to order a few minutes after seven o'clock by O. B. Hadwen, Esq., chairman of the committee of arrangements, who announced the subject of the lecture as "The Climate and Resources of California," by Charles L. Flint, Secretary of the Board. After dwelling briefly upon the topography of the State, its size and general outlines, as modifying climatic influences, giving some statistics in regard to the productions and the wonderful vegetable growths which characterize the Pacific slope, and alluding to the variety of drawbacks to farm life there, a great number of views of natural scenery were presented, with the aid of the stereopticon. In the want of suitable illustrations of the striking features of the Yosemite and the Sierra Nevada mountains, and the noted points of interest along the line of the Pacific Railroad, a report of the lecture is necessarily omitted.

SECOND DAY.

The Board met at ten o'clock on Wednesday morning, and Major S. B. PHINNEY of Barnstable was chosen Chairman for the day.

BREEDING AND MANAGEMENT OF POULTRY.

BY I. K. FELCH, ESQ., OF NATICK.

Through the influence of the Board, the State has done much for the other branches of her agriculture, and I am pleased to see the attention of the Board called to the too long neglected interest of poultry husbandry, which has been considered of minor importance by our farmers, fit only for children to consider. Yet, in this poultry product of the land, we see an interest second to none other considered under the head of agriculture.

The census for 1870 informs us that the cotton crop was 3,011,996 bales; the corn crop, 761,000,000 bushels; the wheat crop, 288,000,000 bushels; the value of all the cattle, sheep, and swine slaughtered or sold to be slaughtered was $398,956,376; the hay crop, 28,000,000 tons, valued at $14 (a high estimate), was $384,000,000.

The assertion that the egg and poultry produce of the States exceeds either of these large products, is met with derision; yet it is true, and the produce finds no rival save in the entire meat and dairy product combined.

Compute the nine millions of families in the States as consuming but two dozen eggs per week, and ($20) twenty dollars' worth of poultry per year, and we have (computing eggs at twenty-five cents per dozen) over $405,000,000. Nor is this all. Large as it is, to it must be added the consumption by the saloons, restaurants, confectionery establishments, our thousands of hotels, together with the medicinal and chemical and exportation demand, which will swell the amount to not less than five hundred millions of dollars as the annual product of the United States; an interest worthy of our considerate investigation. When we commence to make figures, we become amazed at their magnitude; and that you may not underrate the hotel consumption, I will say that a New York innkeeper offers sixty cents per dozen for three hundred dozen of eggs per day, if he can find the party who will guarantee their delivery fresh; and this is for the demand of three hotels only. The consumption of meat to each guest per day at the Grand Pacific, the proprietor informs me, is $2.50, and two-thirds of that amount is for poultry and game. Another item should be considered in this connection, and that is, thousands of prairie farmers, who live so remote as to make the running of meat-wagons unprofitable, are obliged to rely on their farms for fresh meat, and it is a fact that two-thirds of it is poultry and eggs. It is the custom with them in early winter to kill and pack in snow and ice the supplies of poultry for home use. This, with the richer third of the population who consume far more than the estimate offered, will more than make up for the poor of our Eastern cities, who consider poultry a luxury and seldom indulge in its use. With these items as data, I claim my estimate of five hundred millions to be far less, rather than more, than the actual yearly product, which, as I have said, makes the industry of poultry breeding and keeping one of the largest in which our farmers are interested. Like in comparison as the giant oak to its acorn origin, is this large product, made up from the small collections from the small flocks of fowls seen about the door of the hamlet and the farmhouse, in numbers of 12, 20, 30, and 50, and where a larger number is seen so rarely that they become the exception. These flocks pay a large profit on their cost of production, as may be seen by consulting the different societies' reports. In 1858, we see that thirty-eight fowls, kept in small yards, under unfavorable circumstances, with a market at thirty-eight cents for corn, sixteen and two-thirds cents for eggs, and fifteen cents per pound for poultry, yielded a net profit of $1.38 per head. In 1861, Mr. Mansfield's experiment with one hundred hens, having a free range of the farm, consuming but ninety-three bushels of corn or its equivalent, produced one hundred and forty-seven eggs each (no chickens being raised that year), and yielded a net profit on eggs alone of $1.35 per head; to which, had the value of the guano been added, the figures would have reached the sum of $1.60. These, and other statements, are to be found in the Middlesex South Society's reports, of $2, $2.25, and $2.50

per head profit per annum; and last, but not least, the banner statement of Mr. Whitman in 1873. With fifty-one Leghorns, which laid two hundred and seven eggs each, which he sold for thirty-one cents per dozen, the cost of keeping the fowls being $1.13 each, showing a profit of $4.04 per head, proves conclusively that these small flocks pay much better with care than do other farm stock.

All the different breeds will pay a handsome profit if furnished quarters suitable for their condition, and properly cared for; and, generally, it is best for the breeder to make a specialty of the kind his taste shall dictate. But with my twenty years' experience with all the so-called thoroughbred varieties, I am led to advise, that, taking into consideration the individual merit and associate worth, the selections of Light Brahmas, Leghorns, and Plymouth Rocks will be found to pay the best for extra care.

The Brahma is a superior winter layer, producing the larger number of her eggs from October to May. As poultry, the chicks have to be killed quite young,—say eight to ten weeks old, as broilers; the most profitable time, as roasters, being at eight months. This makes them late as poultry; but to make up for it in a measure, the virgin cocks are tender enough for roasting at even twelve to thirteen months, more so than the native at seven and eight months, and in early spring sell next in price to capons.

The Plymouth Rocks are good average layers, and excellent mothers, their special merit being that they are rapid growers, and make fine poultry for summer and early fall; and so long as the breeders are content to have them fill this middle ground between the small and the Asiatic breeds, so long will they grow in public favor, and remain one of the three best breeds for the farmer's use.

The Leghorns are a non-setting variety, and one of the largest producers of eggs, being most prolific during the warmer months of the year. Their chicks make nice early, though small, broilers, and should be killed as such; for, as roasters, their skin is tough and carcass too small, their chief merit being in egg production alone. They are very quick growers, many pullets commencing to lay at four months and a half old, and there are cases on record, in my own yard, where they have laid at three months and three weeks old. I have also started with eggs and produced three generations in three hundred and sixty-three days. This precocity enables one to raise his stock-birds even after the season is too far advanced to rear successfully the Plymouth Rock or Brahma. Thus you see how peculiarly adapted one to the other the three breeds are, and all of them are hardy, standing much neglect. With them, the farmer easily caters to the wants of the markets the year round.

With the above breeds as stock, the yearly product will average one hundred and fifty eggs and eight chickens to each hen, which will sell (taking Natick market for 1875 as a basis) as follows :—

12½	dozen eggs, at 25 cts. per dozen,	$3 12
4	pairs of chickens, 28 lbs., at 25 cts. per lb.,	7 00
	American guano,	25
	Total,	$10 37

The cost of producing the same being,—

Keeping of hen,	$1 15
15 eggs for incubation,	38
Cost of growing 8 chicks to 35 lbs. live weight, at 9½ cts. per lb.,	3 32
Interest on investment and casualties,	60
Total,	$5 45

To notice some of the other breeds, I will say, "the Hamburg family" is one of merit as egg producers, yielding about one hundred and sixty-five eggs per year, as a rule; and there is a case on record where a single hen of the golden-spangled variety laid one hundred and fifty-one eggs in six months. As poultry, the meat and bone are dark, so much so as not to be desired by market-men. The race is delicate and hard to rear, but when six to eight months old, seems to have become quite hardy, except it be a predisposition to the disease called "black comb,"—but why the disease should be so termed I cannot understand. To be sure, the comb turns black, but the causes come from derangement of the egg-producing organs. I have seen them lie down, their combs become black, and they, to all appearance, dead, when all at once they would expel the egg, and in a few moments they would be singing about the yard as well as ever.

The different varieties of this family are golden-spangle, golden-pencilled, silver-spangle, silver-pencilled,—this last being the old-time Bolton Gray, under which name it was first imported into this country. The white and black varieties are of more recent date than the first four named; the black, I think, the most hardy and prolific of them all.

The Spanish was long known as one of the best layers, and, in fact, the old Minorcas were in every respect equal to the Leghorns, but the breeding of the white face upon this breed has resulted in the fact that much of their merit has been sacrificed. Their eggs are larger than those of any other breed, but in number they fall much behind the average. They are extremely delicate as chicks, but when once matured they seem reasonably hardy; and the contrast of a pure white face and ear-lobe, with their metallic, green-black plumage, makes them much admired. As poultry, here in America, we would not concede, perhaps, that they were up to the average. Their dark legs and white meat are not preferred by the masses.

The Dominique is every way equal in merit as to number of eggs, and in poultry equally as good, as the Plymouth Rock; it being rather under size, compels it to take a second place. In all other points, what has been said for the Plymouth Rocks, would apply to the Dominique.

The French class, comprising Houdans, La Fleche, and Creve Cœur, while they are highly appreciated in France, have failed to give general satisfaction in New England. But Mr. Aldrich of Hyde Park has been successful with the Houdans, and claims for them all that is excellent as table fowls, besides being a good average producer of eggs: they are more inclined to non-setting than otherwise.

But the Houdan and Creve Cœur require warm, dry quarters. They, like the Polish, are inclined to roup if confined in damp quarters.

The La Fleche are the most delicate to rear of the whole class, and in our northern climate are much troubled with a weakness in their limbs. A good healthy hen of this breed, I believe, will lay more eggs from March to October than any other breed, not excepting the Leghorn.

The Cochins are, in England, much preferred. They are good mothers, being covered with long, fluffy feathers. They are hardy, and as layers in winter hard to excel. Their eggs are furnished with a thick shell, and in closely bred birds extremely hard to hatch. I think more chicks die in the shell, hatching, than do those of any other breed. There are the partridge, buff, white, and black varieties, all having their admirers; the partridge being the most beautiful, while the black has undoubtedly the most merit, for they are good layers and fine poultry. For one dollar, the "American Standard of Excellence" can be obtained, which gives a full description of the different breeds. We therefore omit description of breeds in this essay.

As a rule, a bushel of corn will produce nine pounds of live weight in poultry, and, with good even care, one has only to weigh his chicks to know their cost. When fowls are fed sparingly, being kept short, they become an expense; for there is no stock that pays so poorly, if neglected, or as well, if extra care is taken of them. A greater profit will be realized on incubating breeds, if allowed to rear one brood of chicks during the season; for the incubating season gives the laying functions rest, and you get more eggs, I am confident, in the year, beside the care of the brood of chicks gratis; and as the chicks will pay one hundred per cent. profit on their cost, you will find that many of the incubating breeds will pay as well, and even better, than some of the non-setting varieties. In all breeds, it will be found to pay to take pains to make your selections from the best-laying families of the breed, for there is as much difference in them as there is in the Shorthorn breed of cattle for milk.

The smaller the flock, the greater will be found the individual yield; but the most economical provision, taking into the account the care of the flock and greatest comparative profit compared to cost of provision made for them, will be found in groups of fifty, for a greater number will not do as well together. This number can be kept in health and a high productive condition in a house with a laying-room fifteen feet square, an open shed ten by fifteen, posts seven feet high, all under one roof, which can be half-pitch, with a cupola-ventilator twenty inches square. The exhalations from fowls are very poisonous, and it is very essential that they have thorough ventilation. At the same, time we must not expose the flock to a direct draught of air. Fowls, left to themselves, will not stand in a draught, and, when compelled to, they take cold as easily as does the human family.

A window on the south side of the laying-room, six feet long and four feet wide, the sill of which comes down to within one foot of the floor, will warm and light the room, and keep the gravel dry, which will help in the work of deodorizing the droppings. Construct a platform twenty inches from the floor, twenty-two inches wide, around the walls of the room. One foot above the same, place the roost, which should be two and a half, and, for Asiatics, three inches wide,—the corners rounded of. Under the platform construct the nests by means of a portable frame that will be fourteen inches deep, the front made of two strips five inches wide, and a door nine inches wide, which is to be let down to gather the eggs. This will give a passage-way of eight inches in the rear, thus making smooth work in front and giving seclusion to the nests,—the same being easily removed to cleanse them. Avoid all permanent or box-made nests, which become harbors for lice. Avoid, also, the old plan of an inclined plane for roosts, for all the fowls will strive to occupy the highest perch, and many a fight and fall will be the result, which will vastly increase the list of casualties, while the low and level plan saves many from lameness and internal injury; for while a hen will walk up to her perch, if she has the chance she will invariably fly down. Roosting low makes them less breachy; even the smaller breeds, if reared on low perches, will not require a fence more than four and a half to five feet high to fence them in. The floor of the house should be kept covered three to four inches deep with a coarse-fine gravel, not so fine as to be called sand, yet having a loam mixture in it. This will deodorize all the filth and stench—the bane of the poultry-house.

The floor should be raked over at least three times each week (if it cannot be done daily), and all surface filth, with the droppings from the platforms, removed, and the whole replaced with a fresh supply of soil twice each year. The fertilizer thus manufactured will be found excellent for all root-crops, especially onions and carrots.

If the flock is to be confined, and on the least practical amount of ground, each house and shed will need two yards, two rods wide and ten rods long; the two being necessary, so that while one is in use the other can be sowed down to forage crops, thus furnishing the fowls with raw vegetable food,—as much a necessity as grass for the cow, to secure the best results.

In constructing these conveniences for your fowls, do not think you can get along without the open shed, for experience teaches that for a large production of eggs and security of their hatching when set, that the fowls must have the open air daily; and a shed that protects them from the storm and driving winds in winter, and furnishes a cool retreat in summer, will prove a most judicious expenditure. These numbers and fixtures can be augmented to any number required, but each fifty should be a community of itself. Add no more than you can care for as well as you do the first fifty you start with, and on which you have based your calculation of success. The many failures are to be attributed to neglect and failure to care for the many, with a generosity corresponding to that given the first few.

The feed for fowls thus confined may consist of boiled vegetables (parsley, cabbage, squash, seed-cucumbers and potatoes), mashed with wheat-bran and corn-meal, while hot; feeding the same at the morning meal in such quantities as will be eaten up by nine o'clock, allowing the flock to forage till four or five o'clock, when a full feed of small grain and a small portion of corn may be fed to them, adding to the morning meal fresh ground scraps or meat in some form, three days in each week. This will be found sufficient till the frost prevents the further growing of forage crops; then change the feed to what soft food they will eat up at the morning meal,—small grains, sunflower seed, etc., at noon, and what corn they eat at evening. This will maintain the most even animal heat for the twenty-four hours; it being health and heat that produce the eggs, the hen being simply a machine which, if carefully run, must produce the egg or die. During the winter months, feed chopped cabbage and turnips, and rowen hay. Rowen clover is an excellent substitute for grass, and is the only thing we can feed that will produce eggs that will make the golden sponge-cake and custard like that seen in summer. They will eat from five to six pounds per head during the winter, if fed in a rick, keeping them constantly supplied; while it increases their productiveness, it also increases the beauty of their plumage, making it well worth one's trouble to supply the same.

The cost of keeping as above will be found to be from $1.05 to $1.17 cents per head. The construction of such quarters, and the purchase of natives or grade stock, will be from $2.50 to $2.75 cents per head as capital invested.

In this connection, I would like to call your attention to the many natural facilities now unimproved, by which the number of eggs would be increased, and a portion of the food and a large per cent. of the outlay described saved.

There is no reason why fifty fowls to the acre could not range with the cattle in our pasture-lands, and both land and cattle be benefited thereby.

When thus colonized, it is noticeable that certain fowls adhere to certain members of the herd, busy in catching the flies that pester them, and consuming the worms and insects disturbed by grazing.

In most of our pastures there are dry knolls and southern sloping hillsides, in which excavations could be made fifteen by twenty-five feet, the ends and north sides walled up, leaving but the two sides of the laying-room and roof to be built of lumber; even the roof could be thatched, or earth-covered. All of which could be home-constructed, or by the employment of cheap labor. These habitations would be warmer in winter and cooler in summer, and therefore better than the first described. These quarters, located far enough apart to save the expense of fencing for yards, would save the labor of forage-crops and all meat-food, till the frost cut off the natural supply.

No farmer should be excused from utilizing all such facilities adjacent to his building, which, with the barn-cellar and orchard, would, in most cases, enable him to keep at least two hundred and fifty fowls, all of which could be cared for by the younger members of the family, and the profits would secure older and abler help for the heavier work of the farm, and many a boy would be made a thinking, practical farmer, happy in his lot, who now is chafing under his hard home-life, waiting only for age to liberate him.

Farmers of Massachusetts, this poultry-keeping has more than a money value for you. Interest your boys in it, for thereby they learn many of the principles that underlie the successful breeding of stock,—fitting them, when older, the better to manage cattle and horses. The rapid production of chickens enables them to try as many experiments, in a few years, as would take a lifetime with stock. In the breeding of fowls, they learn that like produces like more surely, and only, as a rule, where the stock is bred in line, and that to produce chickens uniform in type and color, they must have, in both sire and dam, a preponderance of the blood of the desired type; they must mate kindred blood judiciously, avoiding too close relationship,—for by mating fowls of one blood for three generations we produce sterility in the egg. They learn that prepotency of sire is more marked in the mating of kindred blood, and in the offspring of dams of weak constitution, and when appearing in the coupling of radically different blood, that it is an exception and not the rule. They learn that the blood most difficult to subjugate, in the end has more lasting quality, and does the flock the most good as a new infusion of blood; these interests, once awakened, cannot slumber; the boys become thoughtful, and, as years increase, you find in them a help not found in your hireling.

So far I have tried to show the best management of adult fowls. But this stock, from year to year, must be renewed; for beyond the second year, younger stock will be found to pay much better, and those birds that are coming two years old in June, should be sold as poultry just before chickens come into the market, when they bring a much better price, and their value will replace them with young stock. If the young stock is to be reared on the farm, it will necessitate the rearing of as many chickens as the breeding-stock number; for chicks hatch nearly equal as to sex, which only enables you to replace the two-year-old birds each year sent to market.

A single brood of chicks will thrive and take care of themselves. With even care, one hundred can be reared in a flock, and all do well. But if more are to be reared, care should be taken to confine those of the same age together,—the February and March chicks in one field, April and May chicks in another, and those hatched later in a third. Each lot will be found to do well; but, if running all together, the young ones get trampled to death by the older ones. Suppose we should rear our children as many do their chicks, the whole family running over and stepping upon the nursling, should we wonder if it grew up crippled and deformed?

Avoid huddling them together. Twelve to fifteen chicks are all that should be allowed to brood in one coop. We are apt to let the brood quarter in the chicken-coop till quite late in the fall, when they outgrow the coop, and crowding into it, they suffer from their own exhalations; and the piling one upon another causes, in many cases, the slipping down of their hips and the one-sided appearance which so often comes to our notice.

The best mode of setting hens is, to sink a barrel on its side one-third into the ground, filling up with earth even with the earth on the outside, using a small quantity of hay to form the nest, especially in early spring. This, you see, will prevent the cold air from reaching the egg through the hay from the under side, and chilling them, while the earth in the barrel becomes heated by the hen, which increases your chances for an early brood. Place one of the chicken-coops described in front of the barrel, and by the means of a slide-door admit the hen to and from the nest. The coop becomes a feeding and dusting yard for her while setting, and a home for her and her brood when hatched, besides preventing her from deserting her eggs. As the season approaches June and July, pour into the barrel, before putting in the earth, a half-pailful of water. The heat of the hen will draw the moisture up, and prevent too rapid evaporation in the eggs, and secure for you a better hatch.

By setting an even number at a time, and doubling up the broods, you can reset the hens thus released (which generally do better the second time), by which means you secure eighteen clutches of chickens from twelve incubating hens, which will produce as a rule about one hundred to one hundred and ten chickens that will be marketable. The overplus will be found to not more than make good the casualties and deformities.

This plan of hatching and rearing the chickens away from your fowl-houses releases them from and prevents the incubation of millions of lice, which are generally produced by setting the hens where they are in the habit of laying. If you wish to see every louse and red-spider, which is the same as the bedbug for the human family, concentrated into twenty inches square, just allow a few hens to incubate in the hen-house. The best food for young chickens, for the first week or ten days, is stale wheat bread, soaked in scalded milk, and occasionally boiled chopped eggs; millet and canary-seed will be found quite forcing, and will give the brood a good start, and it pays to use them for the first two weeks. This feed can be followed by scalded oatmeal, wheat-bran, and corn-meal, mixed, say one-third each, with cracked corn and wheat and whole corn, as soon as large enough to eat it.

It is unadvisable to hatch chickens earlier than the season will admit of getting them on to grass by the time they are four weeks old. If they are hatched earlier than this, sow, when the brood hatches, a frame of oats in your hot-house or kitchen, and cut each day the green oats for them. In this way you can carry the chickens over till the grass comes in the spring, and the trouble thus taken will repay you in the possession of early show birds, that generally sell for a much larger price, according to their merit, then later birds; and only by such care can we hope to win the premiums in the September exhibitions. Diarrhœa is the scourge of young chickens in early spring. When the symptoms appear give only scalded milk as drink, and none but cooked food, which will be found generally to correct the evil.

At four to six months old separate the cockerels from the flock, and feed mashed boiled potatoes, with meal and barley and whole corn, thus fitting them for the shambles; and the pullets at five months old place in your breeding-pens, where they will soon commence to repay you for their care, and most assuredly in a like proportion. In nearly all the cases where we find people breeding in this practical way, we find them using only what we call native or mongrel stock. This, I believe, is a mistake, for the thoroughbred is worth as much, and many of the breeds far more, for this practical work; and should all use the thoroughbred, killing as now they do one-third for poultry, using the poorer number left to produce eggs for the market, using as breeders only the best they raise, selling only for breeding purposes when a fair price (say from two dollars and fifty cents to ten dollars each) could be realized, they would in this way raise the standard and come to realize that in every twelve fowls they kept they had the value of a cow, and, caring for them as well, they would find they paid as well.

Show me a farmer who is conscious of capital invested in his fowls, and I will show you a farmer who makes money out of them. The greater the number raised, the higher the price you will be able to command for the best individual specimens. This has proved true in cattle. (See history of Shorthorn cattle in America.) It is every day being repeated in fowls. Twenty-five years ago, I sold Light Brahmas at one dollar each, and the price was considered a fair one, the native then selling for thirty-three cents. When the price increased to twenty-five dollars per trio, it became the town talk; but in the past three years, when I have sold cockerels at one hundred dollars each, and trios at one hundred and fifty dollars, it has ceased to be a surprise, and really it is not in keeping with bulls at seventeen thousand dollars each. I expect to live to see specimens of superior excellence sold as high as two hundred and fifty dollars. Already, in England, five hundred dollars a trio has been realized.

In setting up your boys in the business of practical poultry keeping, or for breeding for the thoroughbred market, it is well that they have a motive and aim in view,—something that will interest and instruct, as well as make them money. I will therefore give my rule to secure improved type and color in breeding, or how to establish a strain of such blood, hoping by interesting them in the theory, to interest them in the practical workings of it.

The American people are lovers of "beauty" in everything; a beautiful horse, a beautiful cow, a beautiful fowl, all demand a price far above those of equal merit that fail in symmetry.

Then, in breeding, aim to attain: first, beauty or symmetry; second, color; and both coupled with merit as egg producers; and as the first two are to be transmitted in a greater degree by the male, it becomes of great importance that he should possess those desirable features.

In selecting a sire, be sure that he is *well bred*, and comes from *a line* of "*good ones*," a bird which is the counterpart of his sire; for then you have a double guarantee that he will control the get. As a rule, the offspring breed back to the grandsire. The sire and grandsire being alike, we start with an almost certainty of success, if we do our part in the mating. Having made our selection, we must put our foot down and stand firmly to the rule of breeding to no sires but this one, or males of his get, and none of them that do not assume the likeness of the sire; thus establishing a line, or "strain of blood," which, in a single word, means uniformity.

In the hen, secure first, productiveness as to eggs; second, a robust constitution, coming from a long-lived race; third, color; lastly, symmetry: and from this mating select the large pullets that most resemble the sire, and breed them back to the sire. This second crop of birds will be three-fourths the blood of the sire you selected as founder of your strain.

Now the more stubbornly the blood of the first dam gives up to the blood of the sire, the more good it will do us when subjected properly to him.

Many select well-bred hens of a weakly constitution to make the first cross, for they assert, and truthfully, that the sire being so robust and strong, nearly all the chicks favor the sire. This is all true, but it is also true that the blood used in the hen is weak and will fail in lasting quality. I like strong blood; that which in the first cross seems to fight for the breeding influence; that which has got to be bred back to the strain desired, and the control given if only by a preponderance of blood. We then get a lasting good from the cross. Constitution and vital force must come from the dam, form and color from the sire; and in all the matings, the introduction of new blood must be with a thought to that end.

The crossing of two well-bred strains oftentimes produces a distinct and new type which is very beautiful. To secure this new type (which is in itself a fact that the two elements producing were of equal strength, as neither controlled the breeding), and to perpetuate it, it would in that case be wise to select a dam of delicate though pure blood, thus giving the sire all the chance possible to stamp its offspring; then by breeding his pullet back, to concentrate his breeding in his grand-children, they also being his children; then we could go on, by selections of coarser or stronger dams for new blood for the strain. The American breeder is of a restless nature; he wants something that is peculiar to himself; something in which he can be identified. You find them all over the country, chopping up the blood of their birds by the introduction of new sires, first from one flock, then from another, hoping thereby to have something different. They succeed; but when they have got it, they are disappointed because no one else wants it. They then think the bottom has gone out of the chicken business, and they curse the business and retire. Of such I will say, the business is better off when they do retire from it. Now, there is but the one way to reach uniformity in breeding, no matter whether it is horses, cattle, or fowls, and that is by "in breeding," and, like poison, it may kill or cure, just according as we display good judgment in its use.

Whenever we introduce new dams to a strain, breed their get back to a sire of the strain, and never use sires from this new introduction of blood until the blood has become thoroughly subjected to the strain.

To explain: if the chicks of the mating of the pullets to sires of the strain are not all in type like the strain, then breed back again, and not use a male as a stock bird until the desired affinity of the blood has been accomplished. As a rule, use no male with less than seven-eighths of the blood of the strain, nor females with less than three-fourths of the blood of your strain as stock birds.

If all the breeders would adopt this plan of breeding, and would keep a record, they would see then the importance of pedigree, and how beautifully all these things are governed by a natural law. We can mix the blood of our birds as easily as we mix the paints that give us different tints in color. By adhering to this mode, one breeder becomes of benefit to his neighbor breeder; for by crossing the strains, the pullets become of equal value to each: each breeding back to their respective strains makes the blood of his neighbor's strain feed the blood of his own. When breeders learn this, and work together, and give up the jealousy that now exists, they will all be better off, and may become founders of families in fowls, as now breeders of Shorthorns become in cattle.

Mr. FLINT. I have been exceedingly interested in the paper which has been read by Mr. Felch. I am sure he has come up to the expectations of those who had so much confidence, when they invited him to prepare this paper. Mr. Felch has had many years of thorough and careful experience and accurate observation, and I am sure the principles which he has enunciated in his paper will be of great interest and great value to the large number of poultry breeders in this State.

I should very much like to hear the experience and observation of those who are now engaged practically, every day, in poultry breeding. There are a great many questions, I know, that many persons wish to hear discussed, and there are others here who can discuss them better than I can. I have been a somewhat extensive poultry breeder in the course of my life. I have kept a great variety of fowls; too great a variety, altogether, I am sure, for profit. I have generally come to the conclusion, that where profit, for poultry and eggs together, is concerned, the Light Brahma is the best breed; but as egg producers, the White Leghorn, and perhaps one or two other breeds, greatly surpass them. I know that Dr. Fisher here has some stories which are quite remarkable as far as the actual productiveness of White Leghorns is concerned. I have seen his poultry, and the manner in which he keeps them; it is very admirable, and I am sure he will be able to give us a statement which will be of great value.

So far as the feeding of poultry is concerned, I am pretty well satisfied that farmers and those who keep poultry are inclined to feed too much corn. Corn, as you all know, will induce fat, and when poultry are to be fatted for market, they can be fatted, probably, quicker and more economically upon corn or corn-meal, heated, than upon any other substance; but as far as my experience has gone, it is not advisable to feed corn if you wish to get the largest number of eggs; it induces too great fat, especially if the hens are kept in some confinement. Hens that are allowed the whole range of the farm may be fed upon almost anything. They run off what little extra fat they get, perhaps, by eating too much corn; but poultry that are confined, or partially confined, ought not to be fed too much upon corn. Oats, or any of the smaller grains, and vegetables, potatoes, fish, and that class of food, it seems to me, are very much better.

As far as the feeding of fresh or cured rowen or young clover is concerned, I have no doubt that what Mr. Felch has said is correct.

QUESTION. Is there any danger of making White Leghorns so fat by feeding them on corn that they cannot fly?

Mr. FELCH. I don't think you can give them anything that will fat them so that they cannot run or fly. But as egg producers, there is no question that the White Leghorn family is the best. They will forage for themselves, and pretty thoroughly, and they are stronger in their feet than the Asiatic breeds, if we are to judge by the damage they will do in the garden.

QUESTION. Do you have bottoms to your coops?

Mr. FELCH. I do not. I have simply platforms for early spring, on which to place the coops, in the summer allowing them to set on the ground.

QUESTION. How do you feed the clover rowen?

Mr. FELCH. After curing it becomes brittle; simply feed in a rick, as to stock. If it is cut up too fine, and fed carelessly, they will waste it.

Mr. ———. I had two hens that destroyed themselves by eating rowen this last season.

Mr. FELCH. Clover rowen is very brittle. It is not like the second crop of herdsgrass.

QUESTION. Which is best, the Brown or White Leghorn?

Mr. FELCH. I do not think any one would say one was better than the other.

QUESTION. Do you have any difficulty in hatching chickens from the eggs that are laid by the Asiatics?

MR. FELCH. That is the danger of the whole business. They sometimes become so very fat, that it will be almost impossible to hatch an egg from them. Turn them right out and give them food that will not fat them, and you will find that the eggs will hatch well.

MR. HERSEY of Hingham. Mr. Felch says that close breeding in and in tends to sterility. I would like to inquire if he has had any actual tests of this, and if so, what difficulties he has encountered.

MR. FELCH. What I mean by in-and-in breeding is breeding birds of the same blood or pedigree together. I always take pains when I am breeding in line, "breeding in," as I term it, to so mate that there will be a change of blood, and secure the chick in blood different from sire and dam. It is always better to breed back to the sire than to breed the chicks together. When introducing a new element of blood, I find oftentimes that this works well. That is a rule I have followed for twenty years. I believe I was one of the first to adopt this course. I never buy a male bird, and consequently I have been obliged to make this new blood for scores of others; and when I buy a new bird, I treat it in that way, breeding the pullets of the first cross right back to a sire of that strain, and never use a male bird until I have reduced the foreign blood to one-eighth. Now, if you breed in and in for three generations, that is, breed brothers and sisters, in three generations it will be almost impossible to hatch an egg.

MR. HERSEY. Have you had any actual tests of it?

MR. FELCH. Yes, sir; I believe, as a rule, the statement I make will hold good. There may be exceptions; there are exceptions to all rules. But I think if any one follows that rule, so that he will know exactly what he is doing, he will find that I am correct. But the fact is, a great many don't know. They will have a flock of birds, and they will save a young cockerel from them and breed from them, thinking they are all of one blood. If they will start from one single dam and breed her chickens together, and their chickens, and then a third lot, I am quite sure you will reach a point where the eggs will not hatch. Unless you have a flock of hens in one inclosure, you can see how easily you can lose the track of them. You cannot get uniformity unless you keep to the same strain of blood. I think any one who has tried it will agree with me in what I have said on that subject.

Mr. HERSEY. I suppose we meet together here to gather facts, and whatever the result of our experiments may be, it is for our interest to know about them. I have had some experience in this poultry business; and I want to say at the outset, that I went into it for my own pleasure and information, and not for the purpose of bringing out any particular result. I am not a poultry breeder for the market. I say this, so that no person will write me for eggs or for poultry, for I am simply one who is seeking for knowledge.

Twenty-five years ago, I started for the purpose of demonstrating, one way or another, whether we should be able to breed in and in or not. I took a white native, and from that white native I have bred for twenty-five years, and still the eggs hatch. During the twenty-five years, only three times have I introduced anything different, and those three times it was done by eggs and eggs only, and the male birds were not kept, only the females. But during the last two years, no new blood has been introduced into my flock, and I have bred in and in as closely as possible. And my poultry yard is so situated, and so fenced in, that no other poultry can come near them. Now, the result is, that my eggs hatch a great deal better than my neighbors'. Three years ago (which was the last year that I had the care of them myself), I set four litters, of thirteen eggs each, and every one of them hatched; and of four others, eleven hatched. I think there was not a single litter that year that gave less than six chickens from thirteen eggs.

Now, I admit that I have been careful in breeding to take only those fowls which were physically strong and perfectly healthy. I think that that is a point to which we must look carefully. I believe that healthy birds will bring healthy offspring. But perhaps I ought not to say what I believe. I only rose to state these facts. It is an isolated case, covering a period of about twenty-five years. If there were twenty-five other individuals here who could stand up and say that they had tried the same thing, with the same result, we might be able to come to some correct conclusion. Perhaps a single experiment is not sufficient.

Now, if other people have tried the experiment of in-and-in breeding, and failed,—if they have really tried it, and not guessed at it,—of course that must count against the experiment which I have made. But I hope that, if this Board shall meet in this or any other hall ten years from this time, there will be many individuals who will be able to rise up and say, "I know from practical tests what the result is of breeding in and in."

Mr. Felch. The gentleman who has just taken his seat says that the introduction of blood was by eggs, saving the females. That does not meet the case, for he put half a dozen new elements into his stock every time he introduced the eggs, which might have helped him out. I do not see that his case touches the point which I advanced, for one introduction of six pullets would have carried him through the whole twenty years.

In regard to the question of the time that an egg is impregnated, I have tried some experiments to determine that question. I took three hens, after they had set and raised their chickens, and put them with a cock for three hours. Then I kept them by themselves until they had laid their litters out. I found that it took forty-eight hours for them to become impregnated; that the eggs laid during the first forty-eight hours did not hatch; that seven-eighths of the eggs laid during the next ten days thereafter did hatch; and that all the eggs laid after that time did not. That is a fact which it may be of advantage to gentlemen to know, in mating their birds for breeding the coming season. If they pen them ten days before saving the eggs, they will secure purity of blood.

Mr. F. J. Kinney of Worcester. I have had a little experience in breeding poultry, and I will give the result of my experience, and ask a few questions.

It is quite important to know what kind of soil you have. I was very successful in raising poultry in Vermont, where I came from, and never had a case of disease, or any trouble. When I came to Massachusetts, my fowls were sick all the time, and they died constantly, and it took me a year or two to find out what the trouble was. In Vermont, I used to live on a gravelly soil, and when I came here I went on to a heavy loam, and until I covered my ground four inches deep with gravel I could not raise chickens, and my wife could not raise them, so I made up my mind that they could not be raised. Hence I think it is necessary to know what the nature of our ground is, as we want to know what our foundation is before we begin to build. Chicken-coops should always have board bottoms.

Then there is another point. It has been suggested that we dig into a hill somewhere in a pasture and make a place in which to keep our chickens. There is no doubt that such a place would be like the Irishman's woollen shirts, very cool in summer and warm in winter; but most hills will be damp in winter, and that is what everybody wants to avoid. I think, therefore, that it is absolutely necessary that a hen-house should be built on top of the ground.

I am very glad to hear the subject of in-and-in breeding discussed. I have had a little experience in breeding cattle, and I know that those who have had the best luck in breeding Shorthorns, to say the least, are those who have stuck to their own animals, to the exclusion of all others. There is plenty of evidence on that point. Twenty-six or twenty-seven years ago, I commenced breeding Brown Leghorns, and during all that time there has not been one drop of strange blood put into the strain. I have known what I have been about, and that strain has proved a very profitable and pleasant strain to keep. Other strains I have crossed in various ways, but every time I have lost by it. I started with the idea that I would make those fowls lay almost every day, and I am happy to say, that, although I have not been able quite to accomplish that, I can show you the record of one hen, nine years and a half old, that has laid over two thousand eggs, has just returned from the Centennial, and is in good condition yet, and she has never had any strange blood in her. I have bred from her, and the hens of that strain of blood always lay more eggs by half than the hens of other strains that I have got by crossing. I always lose whenever I make a cross. I breed in close confinement, and when I get birds from outside, I get birds that have been bred on farms, and they become weak. It takes me some time to get them used to close confinement. I have several hens that are over eight years old that are good layers now, and yet they never ranged in their lives. My new house is 50 by 16 feet outside, with a roof *very steep;* rafters 16 feet long,—a very important point,—and my room 6 by 12 inside, and my outside runs are 3½ and 2½ by 12, covered with slats. My chickens are kept fifty together until they are three weeks old, and then I keep thirty together until they lay. Mr. Felch says it will be necessary to separate the two genders in from four to six months after they are hatched. He knows very well that Leghorns have to be separated in that number of weeks, instead of months. There is abundant evidence that no Leghorns of any color will be good for anything, either pullets or cockerels, if allowed to run together until they are four months old, for at the age of four weeks, the cockerels are treading not only the pullets but the mother. I always take my cockerels, when they are three or four weeks old, and put them by themselves, about thirty together, and put the pullets together by themselves, and in that way I get very fine poultry from my Leghorn cockerels. Where they are allowed to run with the pullets, the cockerels do not make good poultry, nor the pullets good layers.

In former times, it was thought that it was impossible to breed chickens without a large range, and that a person must have a big farm if he was going to have a thousand chickens. I commenced with less than a sixteenth of an acre, and raised a thousand chickens in one year. They did not go off of that sixteenth of an acre until they were three months old, and they were separated and placed in covered runs, two and one-half feet high, three and one-half feet wide, and twelve feet long, covering about a quarter of an acre, where they remained until they went into their houses. Since then, I have raised three thousand chickens on the same ground, and have had no disease, unless when brought from some exhibition.

I farm chickens for their manure, and whether I get anything else or not, they do not cost me anything. I make their droppings pay their expenses. I do not say I could do this by raising corn or potatoes, although good authorities (George E. Warner for one) say it can be done; but if you raise strawberries, tobacco, or some other of the better paying crops, which it is remarkably well suited for, it will pay all expenses, and then, if you get anything else, it is profit. When I commenced, I cultivated two acres, and bought from thirty to forty cords of manure a year. Now I cultivate eleven acres, and buy none.

This matter of poultry droppings has received too little attention. I have a few statements given by practical men, but they are so indefinite that I have concluded to give you only a few facts from my own experience. In 1870–71, I had seventy-five hens constantly confined for one year. The droppings were all saved by being kept perfectly dry. At the end of the year, I found that I had one hundred and fifty bushels of nearly pure hen-manure from the seventy-five hens, which, after weighing two or three bushels, I estimated was equal to 2,200 pounds. After pulverizing the droppings, I mixed three hundred pounds of plaster and three tons of fine loam, pretty dry and rather poor in quality, thoroughly with the droppings, making (barring loss in mixing) four tons and a half of American guano, as rich in nitrogenous and other valuable qualities as would be bought in our market at that time at sixty dollars a ton. I got two hundred and seventy dollars' worth of manure, and the plaster, soil, and time of preparing it cost about twenty dollars, leaving two hundred and fifty dollars' worth of fertilizers from our seventy-five hens in one year. This fertilizer (American guano) was used in various ways, beside the best well-decomposed manures to be had, and the best special fertilizers, and invariably I have received the greatest benefit from the use of the American guano.

Since that time, I have used hundreds of tons of the same fertilizer, on every kind of crop. I have put it on the surface and harrowed it in, have applied it in a dry and a liquid state in the hill, *cautiously*, and spread it broadcast on my old strawberry-beds, and it has always given me satisfactory returns. I have used manures for thirty years, and am better pleased with American guano than any other. I have found that when my fowls were kept confined, they have always averaged as much manure per head as they did in the year specified ; *i. e.*, three dollars. I can make more manure from one thousand fowls, where they are confined in the way I have described, than any man can from five thousand, kept in the usual way, and allowed a wide range, *quality* taken into account.

Question. What do you feed to your poultry?

Mr. Kinney. It would take me some time to tell what I feed, but I can state my practice generally. My morning feed consists of two quarts Indian meal, four quarts good wheat shorts (the coarser the better), and two quarts ground scraps. Beef scraps are best, thoroughly scalded by pouring into the pails a good deal of boiling water, and stirring it until well mixed; then it is left to cool, and should be pretty stiff when cool enough to feed. For a change, I use ground oats instead of shorts once a week, and ground buckwheat once a week. This amount feeds one hundred laying hens in the morning, and they get as much more bulk of green food; also cabbage (green globe Savoy is the best variety), or mashed turnips, mangolds, or potatoes, *raw*. About half-past two P. M., I feed the same bulk of dry food,—the *coarse* part of cracked corn (I riddle out the fine part and scald it with my morning feed), and wheat, equal quantities, and two quarts of shelling,—pulverized oyster shells, bone, or old mortar,—thoroughly mixed together and scattered amongst leaves or straw, so the fowls will have to scratch and hunt pretty busy to find it. Once or twice a week, I use buckwheat or oats instead of wheat. I occasionally boil a mess of potatoes, and mix my meal and shorts with them, and sometimes boil my grain. They like most anything for a change. People who have milk, can better afford to feed it to hens than hogs. If you scald the feed with milk, they do not need much meat or animal food. *There are no two things nearer alike in their constituent parts than eggs and milk*, so what will make milk will make eggs. Give your hens poor, mouldy grain and dirty water, and they will give you poor eggs and few of them, and they will become sickly, and it will take but little to cause death. If hens are properly fed on strong, good food, and properly watered, and otherwise cared for, they will be well and strong, and lay good, nutritious eggs, and plenty of them. Select your food for your fowls with as much care as you would for yourself, and give them nothing to eat or drink that you would not relish on your own table, and do not confine them in quarters where you and your family could not be comfortable.

Most people, especially gentlemen who keep fowls as amateurs for pleasure, kill them with kindness. I once went to a poultry-house near Boston, the owner of which told me his fowls were constantly dying. I found that the coop lice were killing them. It was an elegant house, cost a great deal of money, and was finished nicer than any room in my house. The fowls, as the gentleman supposed, were well taken care of; every particle of manure was taken out, but the house perfectly swarmed with lice. I saw them strung all along the under side of the roosts, where they had gone to digest their food during the day. These parasites do not live on the fowls, but they feed on them at night, and leave them during the day. I set a great many hens, and I never have any trouble from lice. I have seventy-five setting on a very small space, and have set in *same* room and same boxes for several years, and keep hens in same room in winter, and they are not troubled. A very little sulphur scattered in the nest two or three times a week will keep them off. Take a handful, begin at the *tail* of the hen when on the nest, let your fingers touch the hen's feathers and move the hand towards the head, letting the sulphur scatter from your hand; the hen will raise her feathers and the sulphur will strike her skin.

There is another thing peculiar in my manner of raising chickens. Seven years ago, I commenced making incubators of hens. I lost a few until I learned how; but for four years, I have run from fifty to seventy-five of these incubator hens. I have set them in February, and kept them at work until August. The chickens, as soon as they are hatched, are taken away from the hen, and placed in a clean box, in a temperature of 100° to 103°, the bottom of the box covered one-half with clean sand, suitable for the chicks to eat, and the other half with flannel. They are allowed to run out in small runs in the daytime. Chickens need only *heat* and *gravel* for the first twelve hours, and then they will begin to pick food. We feed the yolks of eggs, boiled hard and mixed with Indian cakes baked hard and pounded up fine (the first twenty-four hours they only need clear egg-yolks and sand), about one yolk to a gill of fine cake. Feed often, and what they will eat up clean. When they are about thirty-six hours old, they will drink water or milk; we give milk to drink, and mix our cakes with new milk. We increase our egg-feed, putting two yolks to a gill in course of a week, and six egg-yolks to a pint at one and one-half weeks, and begin to feed cracked and whole wheat once or twice a day. At two weeks old, we begin to feed boiled meat, and drop our egg-feed, but continue our pounded cake once or twice a day till the chicks are four weeks old, then use cracked corn as the bulk of our feed after chicks are four weeks old,—feeding boiled meat two or three times a day, in moderate quantities. We riddle cracked corn, feeding the coarse part dry, mixed with wheat, in the afternoon, and the fine, mixed with coarse shorts, scalded together, in the morning; change once in a while, if chicks tire of the regular feed. We feed a good many boiled potatoes, with corn-meal and wheat middlings mixed, by mashing the potatoes, meal, etc., together, while the potatoes are hot. We find boiled rice a cheap and very desirable feed to change with. One pound of rice will take in six pounds of water, and makes a good feed for fifty hens.

We use large boxes or small movable houses for the chickens to roost in and run into in rainy weather, and keep these roosting-rooms clean and well littered, making the chickens sit on the ground, or wide roosts, till they are four months old, as roosting on small sticks will crook their breast-bones. After chickens are two or three weeks old, they will begin to eat green food, grass, oats, clover, cabbage (green globe Savoy is the best variety), raw mashed mangold wurtzels, onions, potatoes, etc. Our great study is to make them comfortable, and furnish them some exercise to keep their appetites good.

Chickens grown and cared for in the above manner will weigh as much at three months old, as they would at six months old if running about. Pullets will begin to lay at three or four months old, raised in this way. You will understand that I am speaking of Brown Leghorns. I do not think that White Leghorns or Light Brahmas could stand the confinement.

Question. How would you exterminate the red spider (coop lice) and other vermin?

Mr. Kinney. If the gentleman near Boston, to whom I referred, had taken a little of the tobacco which he had been eating, and burned it in his poultry-house (first having made it tight), he would have got rid of that pest. When I was a boy, I used to read in the papers, "If you want to keep a hen-house free from vermin, fumigate it," but I never heard what to use until quite recently, when I have seen sulphur and tobacco recommended. I have been in the habit, for more than twenty-five years, of burning a few tobacco stems and leaves, once or twice a week in summer, and once in two or three weeks in winter, in my hen-houses. Tobacco smoke does not hurt hens *any more* than people. I think that, like men, they may learn to like it; I think my old hens have. But lice do not like it, and you will find that tobacco will kill the little pests that kill your hens at night, on their roosts, and on the setting nests, when you think they die by some disease.

Mr. Bill of Paxton. I have had some experience in keeping hens, but I rise chiefly to add a word to what was said on one point by the gentleman who gave us the very instructive and interesting essay, and that point is this. He spoke of hen-houses in the sides of hills, near our farm buildings, so that the fowls might forage in the pasture with the cattle. Now, he did not state what breed of hen would be the best for that purpose, but I judge from my own experience that a kind of hen not much in favor, perhaps, with most hen fanciers,—I mean the Red Game,—is the one best adapted to that purpose.

There is an impression abroad among hen dealers, and those who have not inquired into the matter, that the Red Game, or Game hens, are of little value except for their fighting qualities; but with all my keeping of the Red Game, I never have seen one fight but once, and that was with a White Leghorn, and he got awfully thrashed; so I am not keeping him for that purpose. But I find that in the pastures, the Red Game have the foraging quality, and that is the point I rose to make. I know tolerably well four or five kinds of Red Game birds, and any one of them will walk off and feed by themselves several hundred rods,—almost a quarter of a mile.

Another notion that is prevalent about them is, that they are quite wild. That comes partly from the name—Red *Game.*

But I find that the Red Games are as gentle, if you treat them gently, as any hens I ever had anything to do with. As to their laying qualities, I have kept them several years, and I am confident that they do lay well. I would not say that they are as good layers as the White Leghorn or the Brown Leghorn, but I do not know any other family, except the Leghorn, that excels the Red Game in laying qualities.

Another point about the Red Game is, that their eggs are from a quarter to a third larger than the White Brahmas', or than almost any of the pure-blooded hens with which I have had anything to do, except the Leghorn.

Now, I wish to say that I have no eggs to sell, and do not wish to buy, but I would like to ask a question about the Black Spanish. What does Mr. Felch know about them, as to their laying qualities, constitution, etc.?

Mr. Felch. The Black Spanish, before the Leghorn came into notice, was considered the best laying fowl. They lay large eggs, but they do not lay a large number of them. I think that a full-bred Black Spanish will lay about one hundred and twenty-eight eggs in a year,—about what our native fowls will do. Probably there is not half a dozen eggs a year difference in what the Black Spanish, the Game, and native fowls will lay.

Question. How do the Black Spanish stand the cold weather in the winter?

Mr. Felch. Poorly. A Black Spanish chicken is a miserable thing while growing, but when once grown, the fowl seems to be quite hardy. It is a beautiful bird to look at; there is no question about that. If a man does not care how much it costs him to produce and keep a flock of Black Spanish birds, he can have them, and they will do very well, but they are not profitable, managed in a practical way. I tried to find the breed that a person with the least experience could do the best with, everything considered, and that is why I selected the Leghorn, Plymouth Rock, and Light Brahma; and here let me say, that, no matter what the breed is, the Almighty has so fixed that thing that they will all pay a profit, if properly managed. A man wants to take the breed that pleases him, and if he does that, he will be likely to take good care of them and make a profit. One man likes the Red Game, another the Brown Leghorn, and another the Brahma. I do not agree with those who say that the Buff Cochin is the best bird of the lot. The Buff Cochin is a splendid hen to raise chickens, and they are handy to have for that purpose. They look large, but they are not really so. They are very full feathered, and their feathers make them look large.

Mr. VINCENT. The Black Spanish does not want to set.

Mr. FELCH. No; they are of weak constitution. Still, I can hardly say that, because, when once grown, they seem to be hardy, if you can keep them away from the frost. Their wattles and combs are easily chilled, and that seems to take all the life out of them until spring.

QUESTION. What do you consider the best cross?

Mr. FELCH. I consider the best cross in the world is the cross of a White Leghorn cock on a Brahma hen. I say a *White* Leghorn, because that cross will produce a uniform white color. There will be no party-colored feathers, which is an advantage in preparing poultry for the market.

QUESTION. What would be the quantity of eggs produced by that cross?

Mr. FELCH. They will produce as much as either of the thoroughbreds. I have birds in my family of Brahmas that have laid for twenty-three successive months without setting; but that is unnatural. I have received several letters this season from parties to whom I have sent birds of this family, stating that their birds have laid the entire season without wanting to set. The Brahmas, both dark and light, do not lay in that way as a rule.

The Leghorn I call a hardy bird. The Black Spanish I call a delicate bird, because they are predisposed to disease. They must have dry, warm quarters, or they will have the roup. They will have catarrh in the head, and roup follows, and all the attendant diseases. They must have dry quarters. You cannot put them in a damp place with impunity.

Mr. CHEEVER. Is there any limit to the number of eggs that any one of the breeds of hens can lay? I think I have seen it stated in some paper,—from a French authority,—that the ovaries are limited. Do you know anything about that?

Mr. FELCH. I do not feel competent to answer that question. I have seen it stated that a hen will not lay after it gets to be four or five years old. But, two years ago, there was a Light Brahma hen at the exhibition in Boston, that was twelve years and three months old, and she laid three days out of the week. I have had a Light Brahma in my yard this year,—eight years old,—and she laid some forty odd eggs. I believe, therefore, that hens will lay until they are pretty old. I do not believe, as some do, that they will cease laying at four or five years of age; but, as a rule, birds, after they are three years old, begin to fall off in the production of eggs.

QUESTION. Are not pullets the most economical kind to keep for eggs?

Mr. FELCH. The second year appears to be the year of greatest profit. You may raise two chickens,—a pullet and cockerel,—and the day they are twelve months old, the pullet will have supported herself and the cockerel, and if sold at the end of twelve months, that cockerel is net profit. You may base your calculations of profits upon that, and you will find it to be true. A Leghorn, when she commences to lay, will lay, usually, until she moults, and, generally, will not commence to lay again until the next spring. But you get the start of a year, or longer, before it comes to that, if she has good blood in her.

QUESTION. If you were only keeping a few hens for eggs, what kind would you select?

Mr. FELCH. If I were keeping hens for eggs alone, I should most certainly keep the Leghorn breed in preference to any other. Keep the pullets up to the time of moulting, and then sell them and replace them.

QUESTION. Have you had any experience in regard to the laying qualities of the Hamburg?

Mr. FELCH. The Hamburg family will lay as many eggs, probably, as the Leghorn. They are handsome birds; and if any one has an eye for beauty, and wants a few handsome birds for eggs alone, I should recommend the Hamburg family. They are a little tender in raising, but, like the Black Spanish, they seem to become hardy afterwards. They lay well. I have had Hamburgs that laid one hundred and fifty-one eggs in six months. That is recorded in the report of the Middlesex South Agricultural Society for the year 1858, and it is also reported, I think, in the State Agricultural Report of that year. The Black Hamburg is, I believe, the best of the family to raise chickens, and that, perhaps, is attributable to a cross. I think there is a Black Spanish cross that went into the original Hamburg, that produced the Black Hamburg. The other varieties of the Hamburg family are the silver and golden-spangled and the silver and golden-pencilled. The white and black are two varieties of that class produced within my recollection.

Mr. HADWEN of Worcester. I have bred and kept poultry for nearly forty years, and I can truly say that I have no prejudice against any of the breeds. If they are well cared for, as Mr. Felch has said, they will all pay a person a profit. But it is often a question what kind of poultry we shall keep. Now, that depends upon various circumstances. In the first place, What do you want the poultry for? If you want eggs, there are the egg producers,—the Black Spanish, the Leghorn, the Hamburg,—and that class of poultry. If you want flesh only, there are the Dorkings, the Brahmas, and Cochins. But farmers want a kind of poultry that is adapted to the production of eggs and flesh, and with a constitution that will withstand our climate. Now, the question is, What kind of poultry is the farmer to choose? The Englishman says, the Dorking. But it is a well-known fact that the Dorking is a little tender in our climate, and requires a great deal of care. The man who successfully raises a Dorking must feed that chicken some eight times a day, and the last thing at night. A gentleman once told me that he bred Dorkings successfully. He said he had a man on his farm, and he lost quite a number of chickens. Upon inquiry, he found that the man fed them but three times a day, and he said to him, "Unless you can feed those chickens eight times a day, you are not equal to your place." When they received that food, he was successful.

Now, a question has come up in relation to the roup. I have no doubt there are many farmers present who do not know what roup is. I kept hens for more than twenty-five years before I knew what roup was; but after I began to exhibit hens at our exhibitions, I found out, and as long as I continued to exhibit, I knew what roup was by experience, and had a great deal of difficulty. I have stopped exhibiting fowls now, and I have no roup. I think the roup is a disease that is contagious, and that is spread by our exhibitions. Our recent exhibitions, it is well known, continue for several days; the poultry is brought together from all sections of the State and country, and many of the birds are diseased, and the disease is communicated to nearly the entire lot. It can be cured, but it is attended with a great deal of difficulty.

I do not know that I have any more to say, unless I speak briefly of a breed of poultry that has been bred for forty years by a former member of the Board. This breed, which is called the Wilbraham, has been kept upon one farm for forty years. How they have been bred, I do not know, but I know one thing,—it is the same breed. The birds are white, with small heads and combs,—combs that will withstand our frosts without injury,—with yellow legs, full breasts, and five toes. There is no doubt that there is an infusion of the Dorking in the blood. I have tried this poultry as an experiment for the last two years, and I find it eminently satisfactory. It is really the best poultry for farmers that I have ever tried, and there are very few breeds that I have not tried.

I do not say this because I have any to sell, for I have not. I have never offered any for sale, and am out of the poultry line, in a speculative way. But it strikes me that for farmers who let their poultry run at large, this is a very desirable breed. They are not susceptible to frost, they are good egg producers, and reasonably good setters. I will not occupy any more time.

On motion, the subject of Poultry Breeding was laid on the table, and Mr. Flint read the following paper—

ON THE COLORADO BEETLE.

BY A. S. PACKARD, JR., M. D.

This beetle was originally described by Mr. Say in 1824, having been found by him the year previous, when he remarked, "This species seems to be not uncommon on the Upper Missouri, where it was obtained by Mr. Nuttall and by myself. The variety (white with two of the lines united, probably the species *juncta*) I found on the Arkansas." (Journal Academy of Natural Sciences, Phila., iii, 1824.) This would indicate that its natural habitat was the plains of Dakota, Western Nebraska and Kansas, Colorado, and, perhaps, the western portion of Indian Territory and Texas. Dr. G. H. Horn, the well-known coleopterist, writes me as follows: "West of the Mississippi I have it from Texas. I have never seen it from Mexico nor west of the Rocky Mountains. If it goes west, I believe it will be through New Mexico and Arizona, and not over the Rocky Mountains." Probably, coëxtensive with the original distribution of the Colorado potato-beetle, is that of its original food-plant, a wild species of *Solanum*, concerning which Mr. Sereno Watson, the botanist of the U. S. Geological Survey of the 100th Parallel, thus writes me: "The *Solanum rostratum* ranges from Texas and New Mexico to the Upper Missouri eastward of the mountains. I have no evidence of its being found at all west of the Rocky Mountains, and, indeed, the order appears to be almost wholly wanting throughout the entire Great Basin."

In going to Colorado in 1875, while attached to Prof. F. V. Hayden's Geological Survey of the Territories, I first met with this beetle at Lawrence, Kansas, where Prof. F. H. Snow told me it was chiefly confined to the *Solanum rostratum*, a roadside weed which is now very abundant in Kansas, and draws off the beetle from the potato, which consequently suffers comparatively little from its attacks in that State.

The question arises whether the cultivation of this weed around potato fields in the East may not be a means of relief from its attacks, though it might breed in still larger numbers, if that were possible.

In Colorado, I first noticed the beetle in the vicinity of Denver, where it was not then common, but earlier in the season had ravaged potato fields out of town. At Golden, July 3, it was observed in abundance on *Solanum rostratum;* not only the eggs, but the larvæ in all stages as well as the beetles. I was told by one farmer that he had two rows of potatoes devoured by them earlier in the season. Near Denver, the potatoes had been injured by them early in the season, and they had been abundant locally at Howardsville. It is evident that in Colorado the injury to the potato will always be limited. Five or six miles up Clear Creek Cañon, it has injured the potato plants for five or six years, but nowhere above an altitude of about seven thousand feet could I learn that it occurred, and it seems indigenous only to the plains and the cañons among the foot-hills. None were to be seen in Utah.

ITS JOURNEY FROM THE PLAINS EAST OF THE ROCKY MOUNTAINS TO THE ATLANTIC.

The history of the successive invasions of the prairies of the Mississipi Valley and of the wooded district of the Middle and North-Eastern States, until only the ocean proved a sufficient barrier to their advances, is a subject of a good deal of interest to the naturalist, whatever may be thought of the dismay with which Eastern farmers have looked upon its arrival. Some years ago, it was confidently announced that the Colorado beetle would not flourish in the damp, cold climate of New England; that the summers were so wet that it would die while lying as a pupa underground. But at the present time of writing (Sept. 15, 1876), it is doing perhaps as much damage in the North-Eastern States as in the Western, and the newspapers report that it has crossed the Atlantic and effected a landing in England. If this is so, for the statement needs confirmation, there is no reason why it should not overrun Europe, after successfully withstanding the great differences in climate between the eastern and western regions of the United States. This insect, so indifferent to ordinary climatic differences, may be compared to a weed which, introduced in a new country, overruns and displaces the native vegetation. Like weeds, the Colorado potato-beetle, with a number of other widely destructive insects, may be regarded as *prepotent* animals.

Fortunately for the historian of the movements of this insect, the late Mr. B. D. Walsh, at an early date after it began to spread eastward from the plains of Colorado, published in the "Practical Entomologist," Vol. 1, No. 1, October, 1865, an account of its travels. In 1859, it had, in its journey eastward, reached a point one hundred miles west of Omaha, Nebraska. It appeared in Kansas and Iowa in 1861.

It entered South-Western Wisconsin in 1862. In 1864 and 1865 it crossed the Mississippi River, entering Illinois from the eastern borders of North Missouri and from Iowa "upon at least five different points on a line of two hundred miles." Thence it has travelled eastward at the rate of a little over seventy miles a year. In 1867, it had appeared in Western Indiana and South-western Michigan, and in 1868 had generally overspread Indiana and appeared in Ohio. From the statements of Mr. Riley, it appears that this insect entered Canada in July, 1870, and swarmed in 1871 between the St. Clair and Niagara rivers; the same year, Dr. Trimble reported its presence in Pennsylvania, and in 1871 it also was seen in New York. A Southern column advanced eastward into Kentucky, arriving there probably in 1869. In 1872, it had reached Lancaster County, Pa., and Cattaraugus County, New York; and in 1873, according to Mr. Riley, it had pushed to the extreme eastern limit of that State. It was reported in the same year to have been seen in the District of Columbia, according to the Monthly Report of the Department of Agriculture for August and September, 1873.

In 1874, it became well established in Connecticut, New Jersey, New York, Pennsylvania, Delaware, Maryland, and Virginia (Riley's Seventh Report).

In the summer of 1874, it appeared at Williamstown, Mass., in small numbers, as I am told by Mr. J. S. Kingsley. Its first appearance in the centre of this State was in Belchertown, where, I am informed by Mr. L. W. Goodell, "a single larva was found July 15, and was apparently the last one of a brood, as several hills of potatoes near were entirely denuded of foliage, and I could find no others, nor signs of any, in that or other fields of potatoes in the vicinity, although I searched carefully. The one taken was placed in a box of earth, and immediately buried itself and was transformed to a beetle eleven days thereafter. About this time I found and killed some fifty of the beetles on the same potato-patch, which were probably a part of the same brood. No more of the larvæ were seen for about three weeks, when they made their appearance in large numbers in several fields."

At the same time I learned from Mr. Isaac L. Ham of Winchendon, Mass., a town about eighty miles west of Boston, that eggs and beetles were found on the vines the 20th of July, 1875. Beetles were seen at Lowell in August, 1875. It appears from these facts that the beetles must have been introduced along lines of railway in different portions of Massachusetts in 1874.

When I visited these fields during the last of September, 1875, thousands of the larvæ in different stages of growth were to be seen on the vines. The present year (1876), the potato-fields in the neighborhood of Amherst were overrun with them soon after the plants came up, and in September, I saw the beetles everywhere. In 1877, the yield of potatoes will be undoubtedly very light, and potatoes high priced. During the autumn of 1876, they were said to be unusually high.

Essex County, Mass., was overrun with the beetles during the present year. They first attracted attention during the first week in June.

In 1875, it appeared in the western part of Vermont, and during the summer of 1876, has been reported as more or less abundant in various parts of the State. In 1875, it appeared for the first time in New Hampshire. In 1866, Mr. Walsh predicted that it would reach Maine "in ten or twelve years." His prediction has proved to be a true one. In Maine, according to Prof. C. H. Fernald, it was first seen in 1875, and occurred not, so far as I can learn, on the south-western border of the State, but in the central portion, and this leads me to think that its appearance there, as well as in New England generally, has been accelerated by its transportation on freight cars, which have been sent through from different points in the West. It is a well-determined fact, that the diffusion of noxious insects over the United States is greatly promoted by railways and "through" freight cars, as permanent tracks are thus made through forests and across rivers, the natural barriers of insect life.

HABITS.

The habits of the Colorado potato-beetle are apparently the same in New England as in Illinois or Missouri, where it has been watched and studied for more than a dozen years. The following account is based on the observations of Messrs. Walsh, Shimer, Riley, Le Barron, and myself. The beetle having wintered a few inches under the surface of the ground, appears above the surface before the potato-plants come up (in New England early in May), and feeds on the young shoots, and by the time the leaves are expanded, lays its eggs on the underside of the leaf in clusters of from thirty to forty, side by side, the eggs standing on end. The eggs are oval-cylindrical, and orange-red in color. Regarding the number of eggs laid, Dr. Shimer writes as follows, in the "Practical Entomologist" for 1866: "From an equal number of males and females, well fed and made as comfortable as possible in confinement, I obtained an average of seven hundred and nineteen eggs to each female; but in the fresh, pure air, sunlight, and freedom of nature, under propitious circumstances, I have no doubt of its exceeding a thousand. They laid some eggs every day for forty days, commencing July 15, and ending on the 1st of September. The smallest average was in the first part of this time, being seven and one-half eggs per day to each female; the greatest average was about the middle of the time, seventy-five eggs; the last day they averaged twelve and one-half eggs."

The young grubs, on hatching out, are deep blood-red, but of nearly the same form as the adult. They usually first appear on the leaves, in New England, early in June. The following summary of its habits is taken from Riley's Frst Report, and applies to Missouri, Illinois and neighboring States: "In the latitude of St. Louis, there are three broods during the year, the last brood wintering over in the beetle state underground. They are usually dug up in the spring of the year in land that had been planted to potatoes the year before. The beetles issue of their own accord from the ground about the first of May, and the last brood of beetles enters the ground to hybernate during the month of October. Though, in general terms, this beetle may be said to be three-brooded, yet it may be found at almost any time of the year in all its different stages. This is owing to the fact that the female continues to deposit her eggs in patches, from time to time, covering a period of about forty days, and also from the fact that among those larvæ which all hatch out in one day, some will develop and become beetles a week and even ten days earlier than others. Thus it may be, that some of the late individuals of the third brood pass the winter in the pupa state, though the normal habit is to transform to beetles. Each female is capable of depositing upwards of a thousand eggs before she becomes barren, and in from thirty to forty days from the time they are deposited, they will have produced perfect beetles. These beetles are again capable of depositing eggs in about two weeks after issuing from the ground, and thus, in about fifty days after the egg is laid, the offspring begins to propagate. It is formed in a little cavity which the larva had made perfectly smooth and hard, and it is of the same color as the larva. The beetle, on first emerging from it, is quite pale and soft, without any markings whatever."

Although no species of this family are known to be poisonous, yet it is probably true, from the facts adduced by Riley and others, that the fumes arising from the bodies of a large number of them, when killed by hot water, produce sickness. This is due, perhaps, to a volatile poison thrown off immediately after death ; but, since fowl feed upon them to a large extent, and no one has been known to have been poisoned, at least severely, in handling them, there is no reason why hand-picking should not be resorted to.

ENEMIES OF THE COLORADO POTATO-BEETLE.

Besides a number of bugs and beetles which devour this beetle, a species of *Lydella* (*L. doryphoræ*, Riley) is very destructive to it. Mr. Riley says : "This fly destroyed fully ten per cent. of the second brood, and fifty per cent. of the third brood of potato-beetles that were in my garden. It bears a very close resemblance, both in color and size, to the common house-fly, but is readily distinguished from the latter by its extremely brilliant silver-white face." No *Ichneumon* parasite has yet been found preying upon it.

REMEDIES.

The surest and safest remedy is hand-picking. As soon as the eggs are laid, they should be looked for on the underside of the leaf, and the leaf torn off and burned. Afterwards, the grubs and beetles should be picked off. The following extract from a correspondent of the New York "Tribune" shows the efficacy of this remedy : "From June 7 to August 17, I have caught and killed, by actual counting, over eighteen thousand (18,802) 'hard-shells,' without reckoning the eggs and young ones, on less than a quarter of an acre of potatoes, so that not a vine has lost its leaves. The bugs have stripped the neighboring patches, and now come swarming on mine. My neighbors Paris-greened, scalded, mashed and burned bugs till the vines had blossomed, then let them live, grow fat and migrate. Would it be feasible to fine the negligent, bug-catching farmers next year, and offer medals to the diligent?"

While hand-picking should be practised, and, perhaps, state bounties paid for the eggs, grubs and beetles, prizes might be offered by agricultural societies for the largest collections. Coöperation among farmers and others should also be urged, even if legislation should have to be resorted to. President P. A. Chadbourne of Williams College advocates higher culture. "Since," he has remarked, "it costs as much to protect an acre of potatoes, yielding twenty bushels, as one yielding one hundred bushels, less land should be planted and more highly cultivated, as, on soil properly tilled, it would, perhaps, not cost more than five cents a bushel to protect the potatoes." The aid of fowl should also be invoked, as chickens freely feed on the grubs. In the Western States, the use of Paris green is advocated. This is a preparation of arsenic, and is a deadly poison. If used at all, it should be handled with extreme caution, and only by careful persons, and in gardens and farms where no children are about. One part of Paris green may be mixed with about twenty of cheap flour, and dusted over the vines early in the morning, while the dew is on the leaves. The simplest way is to sift the flour from a fine muslin bag attached to a pole, or from a dredging-box. Various machines have been devised for use on large farms, and liquid preparations and patent sprinklers manufactured for the purpose. Those who are not inclined to use Paris green may use carbolate of lime, made by mixing in the proportion of half an ounce of crude carbolic acid with a pound of lime, forming a powder which can be dusted on the leaves. Others have used air-slacked lime with success. Hellebore is ineffectual.

The following suggestions by Prof. H. H. McAfee of Iowa Agricultural College are valuable: "We know that the *Dory-*

phora 10-*lineata* can only remain healthy and increase rapidly when feeding upon solanaceous plants. Cut off his rations for any considerable length of time, and he will surely die. Hence, if we *plant only early potatoes*, whose tops are all dead by August 10, but few potato-beetles will be found alive on your grounds next season. . . . . A word as to how this policy has worked in practice. During the season past, in which I have grown twenty-one hundred bushels of potatoes on the Iowa Agricultural College farm, the expense of keeping potato-beetles in check by hand-picking, when they became too numerous, has been less than two dollars, and no poison has been used, and no late potatoes have been grown in my department. Of course, where potato-patches are contiguous, any patch may suffer from the neighbors' bugs, so that this policy of autumn starvation must be general to be most effective."

Mr. Flint. I do not know very much about these beetles myself, but I have seen them on potato-patches in Wisconsin, where they were so thick that you could scrape them up by handfuls. I have seen them in all stages of their growth, in immense numbers. We have had them in all parts of Massachusetts, I think, this year, to a limited extent, and we shall unquestionably have them to a vastly greater extent next year. In the course of 1877, they will undoubtedly spread all over New England, so that we are obliged to look this fact in the face, and take the best precautions we can. I think the suggestion to cultivate only very early potatoes is a very good one; but in order to be successful, it ought to be done by all farmers. If one farmer raises early potatoes and his neighbor raises late ones, the insect will be propagated continually. It is better, therefore, to rely on Paris green.

Question. Will they not feed on other vegetables?

Mr. Flint. There are a few other plants, nearly allied to the potato family, which they attack. They attack the tomato also; but they generally prefer the potato.

Dr. Sturtevant of Framingham. On account of the importance of this subject,—the Colorado beetle,—I would like to make a few remarks in confirmation of the paper which has just been read. There is no question that the Colorado potato-beetle is a dangerous enemy, and the farmers of Massachusetts cannot hope to meet him by any half-way measures. The Western farmers have had experience with this pest, and we can profit by their experience to save ourselves, instead of paying for our own. Dr. Packard, in his essay, took the opinion of Prof. McAfee of the Iowa Agricultural College. That paper Dr. Packard quoted from the "Scientific Farmer" of last month. The December number of the "Scientific Farmer" will contain an article from the Professor of the Iowa College, which shows that Prof. McAfee's claims are entirely erroneous; that you cannot kill out the beetle by planting early potatoes; that the only safety is in the use of Paris green, etc. It is no use for Massachusetts farmers to think that they can do anything, except by the use of poisons or hand-picking. Any half-way measure will only result in a greater loss and a larger destruction by the beetles. In the ordinary working of nature, some insect-foe will appear that will destroy this beetle; but until that time comes, we have got to fight it, and clear our own vines.

Mr. Paul of Dighton. I would inquire of the gentleman who read the essay, and also of Dr. Sturtevant, if they think hand-picking is going to accomplish anything, when they have multiplied to the extent our Secretary says he saw them in Wisconsin?

Dr. Sturtevant. I will say that I do not think hand-picking will ever be a popular remedy in New England. The Western farmers may do it; but I do not think, from what I have seen of the beetle on my own plants, and from what I have seen of it on other people's fields, and heard other people say, that hand-picking will be a popular remedy in New England. My own hope is in Paris green, which can be used without any danger to the man who uses it. It is inexpensive, can be used with very little care, is effectual, and never poisons the potato-plant or potato. It must be applied whenever it is necessary,—three times, if necessary.

Mr. ———. I learn, through a brother of mine in Southwestern Connecticut, that they hand-picked until they destroyed the larger portion of them, and then one application of Paris green was sufficient.

Dr. Sturtevant. One application will keep off one brood, but fresh broods come along through the season. I have been out and examined my vines when I could not see the beetle, nor a slug, near them. I have been out two days afterwards, and seen them rolling on the ground, and found the leaves perfectly covered with them, and the beetles marching along seeking for new fields to conquer. It is useless to expect, judging from the experience of the past, that anything but Paris green will kill them. Mix it with flour, and put it in a linen bag, tie the bag on the end of a stick, take another stick in your hand and go along and scatter it over the vines. Or take a tin box with some holes in it,—like a pepper-box,—and do the same; or adopt any way, in fact, that you think will answer the purpose.

Question. Why not mix it with plaster of Paris?

Dr. Sturtevant. Plaster of Paris does not stick quite as well as flour, and it does not adhere to the plant. Paris green kills by adhering to the plant and being eaten by the slug.

Question. It occurs to me that the bug may work on the underside of the leaf, and in that case, would the application of Paris green to the top of the leaf be sufficient?

Dr. Sturtevant. The bug is a very voracious animal, and will eat through the leaf without much trouble. I think, if you put Paris green anywhere near the bug, he will eat his way to it in a short time.

Dr. Wakefield. I have had some experience this year with the Colorado beetle, and picking him from potato-vines. I have some three or four hundred boys, and I have kept them at work this year picking the Colorado beetle. The first Colorado beetle that I ever saw was early in May, in Connecticut, before they appeared in Massachusetts in my region. I live about forty miles west of this city, in the town of Monson. I was down to Meriden, at the school there, and I found the boys all picking Colorado beetles. I supposed that when I returned home, I should have a job for my boys, and it was not more than two weeks before I found that the Colorado beetles were more numerous than my boys. I put them at work and kept them at work for more than three months, every day, or every other day, in my potato-fields. I had something like five or six acres. I saved my crop of potatoes this year. Whether it is going to have the same effect another year, I am not able to say. Whether I could have destroyed them by poison, I don't know. All I know is, that I put my boys in there, and they picked for weeks. They picked off the bugs in the various stages of development, from the time they hatched until they became hardened. We picked them in baskets, put them in piles, and then carted them off and burned them, so that I knew that those we caught were totally destroyed. Well, we had two broods. After we had secured as many as we could of one, the remainder went into the ground, and it was some three or four weeks before another brood came; but they came at different times in different fields, so that we had employment the whole season.

Now, I suppose there are very few farmers who are so well supplied with the material to pick these bugs as I am. Hardly anybody in our State, probably, has three hundred boys. I saved my potato-crop this year; whether the same operation will succeed next year, remains to be seen. I am sure, from what I have seen in my own fields and in other fields, that the beetle is going to prevail throughout Massachusetts. Whether anything can be done to save the crop, whether we can preserve it by poisoning the bugs, whether we can pick them off and destroy them in that way, or whether we have got to give up the production of the potato, and rely for our supply upon some other place, I know not. But I am sure it is going to be a serious evil, and it is an important question how it is to be met; whether this beetle can be eradicated, whether we have got to suffer from its ravages until nature provides a remedy in some form, and whether we can do anything to help ourselves. You have the experience of my boys this year. They have saved the crop. If I had not done anything, I should have had a very poor crop.

Question. How much do you value the work of your boys?

Dr. Wakefield. I have no doubt that if I had paid my boys two dollars a day, the potatoes would not have paid.

Adjourned to two o'clock.

AFTERNOON SESSION.

The Board was called to order at two o'clock by Major PHINNEY, who stated that the subject for discussion this afternoon was the Dairy.

NEEDS OF THE MASSACHUSETTS DAIRY-FARMER.

BY A. W. CHEEVER, EDITOR OF THE "NEW ENGLAND FARMER."

Mr. Chairman,—Farmers of Massachusetts:—According to the programme announced by your Secretary, the subject for discussion this afternoon is, "The Milk, Butter and Cheese Dairy, and the Methods of Marketing,"—a broad subject, indeed, and one which might well occupy a whole week, instead of a single afternoon, for the dairy lies very near to the foundation of our present system of agriculture.

When the time shall come, if it ever does, that our earth becomes so densely populated by mankind that there will be no room for domestic animals; when steam, or other power, shall replace that of oxen and horses, and when each individual shall be compelled to derive his food from the very smallest possible area of land, then, if not before, the tillers of the soil must become independent of animal labor, animal food, and also of animal fertilizers as an aid in the production of food.

But with our present habits and customs, and with our present limited knowledge of the laws of plant-growth and soil-fertilization, it is difficult to realize to what an extent our comfort and happiness depend upon our domestic animals, and especially those which give us our milk, our butter and our cheese.

I might refer to statistical reports, and read to you the number of pounds of butter and cheese, and the number of quarts of milk yearly consumed by the people of our State or of the United States,—of the value of our dairy products shipped to foreign countries; but I will only allude to what many of you, perhaps, already know, that the money paid for the butter which we spread, ever so thinly, on our slices of bread, exceeds the cost of the bread itself; that the butter bills at large hotels and restaurants, and of the great majority of the better class of private families, foot up at the end of the year to a larger sum than any other single item of food, except meat,—more than the flour, more than the sugar, and more than the tea and coffee. Adding to this the cost of the cheese which is found occasionally upon nearly every table, and the value of the milk which is consumed by all classes, from the richest to the poorest, and we can, perhaps, form some faint conception of the vast importance of the dairy cow in the domestic economy of our State and of the nation.

If you are familiar with the language of the grocery or the retail provision store, you know that a rise of a few cents per pound on the price of butter makes more talk among the buyers than a proportional rise on any other article of food, and that however contrary it may be to the rules of etiquette to speak of the food at your friends' table, it is always in order to praise the butter, if it will bear it, or to inquire the prices paid and of whom purchased.

In fact, butter, which was scarcely known to the ancients, and which has always been considered more or less a luxury, has rapidly become, in our own country at least, one of the every-day necessaries of life. Cheese, which, strictly speaking, is really more of a food than butter, although consumed to a large extent, has as yet become of far less importance to the American family than butter; but as improved methods of manufacture may be discovered by which a soft, rich, but pleasant cheese can be made and sold at moderate prices in our home markets, its consumption will undoubtedly be increased to an extent far beyond our present conceptions.

And milk, which is one of the cheapest foods sold in our markets, is yet in the infancy of its production and use, compared with what it might and should be, and to what it would be, if it could reach the consumer in perfect condition, as when drawn from the well-fed and well-cared-for cow.

On consenting to open the discussion of this subject, I asked, "What can I say? What can I tell the dairymen of Massachusetts that will help to make their lives more pleasant or their business more profitable?" A friend answers, "Tell them what you know"; but it seems to me that to tell what any of us *know* about milk, cheese or butter, would not require a very long time in the telling.

We are often warned by agricultural writers and by agricultural talkers, against spending our time in giving *opinions*, when *facts* are what are needed. The truth is, we have very few facts to give. It costs something to collect facts, and when collected they are worth but little until they are compared and worked up by some one who is competent to use facts, and to deduce from them results which may be of practical use.

A cow of one of my neighbors came from the pasture the other evening with an inflamed udder, and the milk, which was thick and clotted, caused the cow pain in the drawing; but after an application of a little salted lard or a bacon-rind to the surface, and a spoonful of saltpetre in her feed, followed by a good night's rest in a comfortable stable, she came out in the morning all right again, and has had no attacks of garget since.

And so my neighbor tells me, or you, or he writes to his newspaper, that salted lard, or a beacon-rind, rubbed on the bag, with a spoonful of saltpetre given in the feed, cured his cow of garget. This is one kind of a fact. The cow was sick, certain remedies were applied, and she was well again. But, on the same evening, one of my cows was attacked in precisely the same way, and the next morning, she too was all right again, but without having been doctored at all. Now, which of these facts is worth the most, or is either of them worth anything?

We are told that experiments are needed, and it is true enough, they are needed; but how many of us are competent to make experiments that shall be worthy of the name, or of the object sought; and if competent, how many have the time, the means, or the untiring patience required for such work?

The "Vermont Dairymen's Association" has reached its seventh year, the "American" its eleventh, each holding protracted meetings where the most intelligent and the most experienced dairymen in the whole country annually gather to discuss those many knotty questions which practical dairymen constantly encounter while pursuing the daily routine of the milk-farm, the butter-room, or the cheese-factory, and yet I believe that the men who have attended those meetings the most constantly are far more modest in their claims to knowledge, and are far less certain of the correctness of their present opinions, than are the average farmers or dairywomen who have learned all they know of butter or cheese making in their own or their mothers' kitchens.

Those who have studied the philosophy of dairying the most, and under the most favorable circumstances, realize above all others how very little is really and absolutely known that ought to be known about milk, butter, and cheese, and the animals from which they are produced.

Go into any of our markets to-day, and how long will it take one to find two cheeses or two packages of butter from different dairies that are alike in texture, in color, and in flavor? Go back to the farms, and how soon will you find two dairymen who keep the same kind of cows and give them the same kinds of feed, set the milk in the same kind of pans, skim at the same age, use the same kind of churn and other tools of the dairy-room, churn at the same temperature, salt and work the butter by the same rules and methods, and, in short, do everything from beginning to end that should be done to make a uniform product?

One of the proprietors of a leading butter firm, doing business in Boston, recently told me that during the many years in which he had been handling butter, he had never yet received butter from different dairies that was any more nearly alike than were the men who brought it in, or the women who made it. The products of every dairy have a character peculiarly their own, which would hardly be the case if we all understood our business, as marble-workers and bricklayers understand theirs. But if these different products were all good, and only varied as the character of different varieties of good fruits vary, there would be less cause for complaint than now, with one-half, or perhaps more, really unpalatable to any but the coarser appetites. Now, what do these facts prove? Simply this, that as dairymen we are yet very ignorant of the laws under which we are working. The hot horseshoe may not be used as frequently now as formerly for driving witches from the churn, but how many of us do really know just why the "butter don't come" as well in November as in June, or why the milk sours most when lightning and thunder shake the earth?

How many can tell why cream is sometimes bitter in cold weather, and what the remedy, or whence those little white specks that are sometimes found in butter? These are questions which, with scores of others, are annually coming up for discussion at our dairymen's meetings, and oftener in the kitchen of almost every dairy farmer. One man may answer some of them to his own satisfaction, but some one else will bring forward facts which seem to overthrow all his philosophy.

We disagree in our theories, we disagree in our methods, and of course we disagree in our products, and this disagreement is evidence conclusive that as dairymen we are ignorant of our business, that we *don't know* enough to agree.

Some of you will remember with what a genuine air of modesty our beloved Agassiz once said in a meeting of this Board, "that everywhere differences—in matters of religion, in matters of politics, in matters of science—arise from our inability to know enough to agree with one another."

I might take up your time by giving you the details of my own methods in the dairy-room, might tell you what kind of pans I use, how often the milk is skimmed, at what temperature the cream is churned, in what kind of a churn, how the butter is worked, how much salt is used, how put up, and how sent to market, and many other of the minor details of butter-making as carried on in my own dairy-room every week in the year, and which seem to me *now* of the highest importance, although well knowing that others are equally successful while adopting methods almost the exact opposite of mine, and which I may within a year adopt in my own practice, and cherish with the same ardor now felt for my present methods.

I own up to having once been a little conceited. I thought I knew exactly how some kinds of dairy-work should be done. I thought that any cream, if brought to the proper temperature, could be churned into butter; but after taking a job from a neighbor, whom I thought knew less than I, and churning very steadily for nearly two whole days cream which had been churned already (though not to my knowledge at the time) more than a week, and then having to give it up, completely exhausted and discouraged, I came to the conclusion that I did not know it all, and that there were some things back of my philosophy of which I had not yet even dreamed.

For some years past my milk, in the winter season, has been scalded before setting for the cream to rise; but this year I am trying to save that labor, and still make as good butter as before, and the present indications are that the experiment will be successful. So I am entirely unprepared to lay down a set of unvarying rules for all dairymen to follow, for there are so many varying conditions of which I could have no knowledge, and over which I could have no control that would effect results in different cases, that a rule which might work well with one, might entirely fail with another.

Good butter and good cheese may be made by several different methods. The milk may be set in large or in small pans, in deep or in shallow vessels, in warm or in cold air. Cream may be churned in five minutes, or in an hour. The butter may be washed, or it may be salted without washing, it may be worked by hand or with paddles, and still be good. Under certain conditions, one method may be vastly better than another. One kind of cream may possibly be as well churned in ten minutes as another kind would be in forty minutes.

There are, however, fundamental principles which underlie the usual methods of manipulating dairy products, which every dairyman should, if possible, understand. It is not enough to know that a certain kind of work, done in a certain way, proved successful once or twice, or a hundred times, if it has ever, even in a single instance, failed, for the one failure proves that there is something about it that we do not fully understand.

Under ordinary conditions, cream churned for a half-hour will reward the operator by changing to butter, but it does not always do so. I think there are very few farmers, who have made butter for a term of years, who cannot recall at least one tedious season at the churn, and I doubt not that some of you can remember several such unpleasant experiences. These long, tiresome spells at the churn-dasher have made inventors of a great many farmers' boys. They have resolved that, when *they* become men, they would invent some sort of a contrivance by which the butter should be *made* to come in spite of the witches.

Just how many different kinds of churns have been invented, I have no means of knowing; but, some years ago, there had been granted patents on over eight thousand in our own country alone, and there have been many others invented since. Nearly all of these patent churns have been made, more or less, upon the paint-mill principle, and are intended to force or grind the butter from the cream, whether it is in the proper condition or not.

Among the earliest churns were the goat-skin sacks for carrying milk from place to place, and by the agitation of the fluid in transportation, little particles of butter were gathered together, which floated on the surface. This would only happen when the conditions were all right. Milkmen sometimes find little lumps of butter floating on the milk in their cans, which have been filled with milk warm from the cow, and carried several miles to market. This shows us that cream, or milk, may be churned without grinding the butter out of it; and, latterly, the tendency of butter-makers has been to study conditions more, and patent churns a great deal less; and the churns which now give the best satisfaction to many of the most successful dairymen, are those which act on precisely the same principle which operated on the milk in the goat-skins some centuries ago.

Both the science and the practice of dairying have made rapid advances within the past ten years. Meetings like this, where farmers can come together and exchange *opinions* even, accomplish a great amount of good, by stimulating thought, and by inducing both practical farmers and scientific investigators to commence and to carry on experiments which shall determine the whys and the wherefores of our usual dairy practices.

However important the dairy industry of our State may be to people of our cities and large manufacturing towns, who annually consume more than fifteen million gallons of milk, at a cost but little below four millions of dollars, yet, to the farmer himself, it is of no less importance, so long as he is dependent upon stock-feeding for the purpose of maintaining the fertility of his farm.

Dairy farming allows all the hay and grain grown on the farm to be consumed at home, and it must be poor land, indeed, that cannot be kept up, at least to its present state of fertility, where this practice prevails, and especially where, besides feeding the home-grown products, large quantities of grain are purchased from abroad.

The production of milk for towns and cities, not too far from the farm, I have for many years considered one of the most profitable branches of business that are carried on by the farmers of the State. The sale of milk brings in a steady daily income, while the manure made from the cattle gives the farmer an additional advantage not realized by the grain-farmer or the orchardist; and nowhere in the State have milk-producers been more successful than around this city of Worcester. The land is excellent and the market is large, while the purchasers are generally industrious and willing to pay for what they buy; but, better than all, they recognize a difference between poor and good milk, and are willing to pay an extra price for an extra quality.

Worcester is the largest city in the State where milk is received from first hands, and where the producer is his own middle-man; and if it were possible for Boston, the great market for half the State, to be supplied in a similar manner, the gain would be great both to the producer and to the consumer. If I can read the signs of the times correctly, the most pressing need of the Massachusetts dairy farmer of to-day—except a more thorough knowledge of his business—is a good, honest milk trade in the city of Boston; and I hope I may be pardoned if, while occupying your time a little longer, I speak more specially of the needs of the Massachusetts dairy farmer, leaving those who may follow, liberty to give the discussion such a direction as shall to them seem most useful.

Within the memory of men who are still making milk for the city market, the people of Boston were furnished their milk, as the people of Worcester are now supplied, by farmers, who delivered their milk to the consumers directly from their own wagons; but as Boston grew in size, it outgrew the capacity of its neighboring milk farms, and the aid of the railroads was called in for bringing a supply from farms further back. This required a division of labor, an agent to step between the farmer and the consumer, and then as the business increased, a subdivision, with a contractor or wholesale dealer, and the pedler or retailer; and as the field of supply widened, still another division, requiring a collector to gather the milk from the farms, thus putting at least three parties between the farmer in the country and the consumer in the city. But this multiplying of middle-men, each of whom receives a share of the proceeds, if not of the profits of the business, is not the worst feature in this method of marketing the farmers' milk, but it is the division of responsibility, in consequence of which the consumer is liable to impositions without the power of placing the blame where it may rightfully belong. Each man's interest is too much a personal or a selfish interest. The farmer cares only to have his milk clean enough and good enough to pass the contractor; the contractor only seeks a full supply of such milk as his pedlers will buy; the pedlers are only anxious to secure enough of such milk as they can sell and make the greatest profit.

Farmers who sell their milk for the city trade, expect, and even require, the contractors to take all they produce during the flush of the season, and to get along with a lesser quantity during the seasons of short supply. The consumers require a steady supply all the time, and an *extra* quantity whenever they may have occasion to call for it. Now, what must be the result? Either the contractor must provide for a fluctuating market by engaging more than he ordinarily requires, or the pedler must find some method of making his milk elastic, so that what would go into a small cup to-day will fill a large one to-morrow.

It is claimed by parties who ought to know, that Boston is better accommodated in her milk-supply than any large city in the country, and yet we have reason to doubt if there has been even a single gallon of perfectly sound and unadulterated or "undoctored" milk sold in that city for years. This seems to be the general opinion of the farmers; the contractors, so far as we know, do not deny it, and if we may believe what "everybody" says, the pedlers know it, and the consumers, with only an occasional exception, seem to have accepted it as a matter of course, until they have actually forgotten how really pure country milk looks or tastes.

Now, until the consumers of milk in Boston learn what pure, rich milk is, and, like the people of Worcester, are willing to pay for it according to its real value, and until the farmers in the country can learn to adapt their supply to the requirements of the market, the middle-men will, as at present, be obliged to fill the gap which distance has placed between the farmer and the table of the consumer. A better public sentiment and a better understanding of the whole business is needed at both ends of the milk-route, in order to secure at all times a full supply of pure milk to the consumer and fair returns to the producer. Just how a reform in this direction is to be brought about is beyond my present power of vision. Of one thing I feel sure, that the scalded skimmed milk from my own dairy in the winter season, and the skimmed milk from Mr. Ellsworth's dairy all the year round, for butter-making, for cheese-making, or for human food, is equal in value to a large proportion of much of the Boston milk by the time it reaches the table of the poorer classes.

If this is a correct statement, then the people of Boston are paying eight cents per quart for what would be worth less than one cent for feeding swine. Understand me. I do not object to the practice of selling cream from the top of milk-cans. If a customer prefers cream to milk, I would have him supplied with cream; for selling cream is as honest a business as selling butter or as selling milk. Nor do I ask the people of Boston to buy my skimmed milk or Mr. Ellsworth's, instead of whole milk, if they can get it; but I do object to selling skimmed milk, watered milk, and doctored milk at whole-milk prices, and I object to that style of doing business which recognizes no difference in the price of goods of a widely different quality.

When in Philadelphia the past summer, I visited several of the milk-supply depots of that city, and it does certainly appear that the people of Philadelphia are much better served than the people of Boston, and that the milk farmers who supply that city are not brought into such close competition with the pump and the aqueduct as are the farmers of our State. The Philadelphia milk contractor receives his milk in summer twice a day. It is brought in over the several railroads as special freight. It is received from the farmers at certain hours, transported by the quickest trains, and delivered at the city stations at other certain hours, from whence it is taken in the contractors' wagons and usually carried directly to the dwellings of the buyers. As it is cooled before leaving the farm, and arrives in the city sweet and sound, there is no necessity for keeping it in the hands of the pedlers another whole day to cool, as is the practice in Boston. The contractor lives in the city, often boards his pedlers, and has large stables connected with his residence where the delivery teams are kept. He contracts with the farmers for a certain quantity of milk per day, and if he has at any time more than he can sell, he sets it for butter-making.

At one of the large depots I visited in June, there were several large barrel churns worked by steam power, and where each day butter was made from the surplus milk which had been engaged in the spring, in anticipation of an extra demand for supplying the visitors to the Centennial Exhibition. The price of milk at retail was eight cents per quart, the farmer receiving about four cents, leaving the other four for defraying the expenses of transportation, for selling, and for the profits of the contractors. At that time there was a large surplus of milk, and it was being made into butter at a loss, for milk is not worth four cents per quart for butter-making, after being carried from twenty to thirty miles over railroads, and jolted and shaken in milk-wagons at each end of the route. The contractors were, however, doing their best to save themselves from loss. The best known methods of butter-making applicable under the circumstances were adopted, and the butter was sold at prices above the average, though not as high as a few of the fancy private dairies.

A sign, neatly painted and lettered, hung over a side door of the contractor's dwelling, on which were words something like the following :—

Fresh butter,	40	cents	per	pound.
New milk,	8	“	“	quart.
Sweet skimmed milk,	4	“	“	“
Buttermilk,	3	“	“	“
Sour milk,	2	“	“	“
New milk,	2	“	“	glass.
Sweet skimmed milk,	1	cent	“	“
Cottage cheese,	2	cents	“	cup.

And behind a little counter stood the wife or daughter of the contractor, attending to the constant calls from men, women and children of the neighborhood, bringing their coppers and their tin-pails for their daily supply of new milk, skimmed milk, buttermilk, or cup of Dutch cheese, according to their several tastes or the financial condition of their purses. Can any one doubt that these customers were well and honestly served? Will men cheat where there is no temptation to dishonesty?

If the Boston milk market could be so purified that the consumer shall receive just what he pays for, the consumption, I believe, would rapidly increase; for if honest, sweet skimmed milk can be sold for half the price that diluted and adulterated skimmed milk now sells for, it would soon take the place of other foods and drinks to a very large extent, while if only pure, whole milk were sold, the number of cows required for producing it would be increased immediately; and there are plenty of farmers who are ready to increase their supply, even at the present low prices, if they could have a steady and reliable market, and could be dealt fairly with in every respect. There is too little sympathy between the several parties who furnish the city with milk; but the great complaint of the milk farmers of Massachusetts at the present time is, that their milk is brought into competition with something which sells for milk, but which is not milk, but something that can be prepared at a much lower cost.

But so long as the inhabitants of Boston are satisfied with what they receive, and acknowledge no difference between different grades of milk, I see little chance for much improvement in the demand for milk from the country. Without a better demand, milk producers must, for a while longer, as heretofore, make their milk and sell it at present prices, or turn their attention in other directions.

The price of milk is low, but I can see no prospect of its being much higher, even with an increased demand. Should the price rise but one cent per quart, with a prospect for a steady demand, the whole State would be turned into milk farms. One of the largest milk producers in my own town has told me, repeatedly, that if the price should go up only one cent per quart, he should expect to see the business ruined within a year by the over-supply which would surely follow.

It is true, that, aside from the profit on the compost-heap, the milk producer who furnishes milk for the city is barely able to get a new dollar for an old one; but milk farming is not the only business from which the profits are derived from the saving of waste materials. The workers in gold and silver, cutters of cloth and leather, pork-packers, soap-makers and dyers often obtain a large share of their net profits from little savings, and the economizing of materials which the more careless would overlook or neglect.

Now, if we must increase our profits by improved methods of production, rather than by higher prices for our products, we need, first, better cows. I do not mean that farmers must make better selections from the cows offered in the market, but I mean that we must breed better cows. In the present condition of the butter, milk and beef market, there is no room in our State for poor cows.

And now I know that you will be hardly prepared to agree with me, when I say that we need but one breed of cows in Massachusetts; but I believe that the statement will yet be found a correct one. Of course, I am talking of cows for business, such as the majority of the farmers of the State would use, if they could obtain them,—a cow which, among cattle, shall be to the dairyman what the "horse of all work" is to the general business men of the country.

Massachusetts has no room for a breed of cows which are worthless for any purpose except the production of beef, and yet every cow should be capable of being profitably turned into beef before her days of usefulness are passed. Nor does Massachusetts, at the present time, need a breed of cattle especially adapted to the yoke; for horses are so rapidly replacing oxen for nearly all purposes, on the road and on the farm, that the average dairy cow will produce oxen fully competent to do all that may be required of them on Massachusetts farms at the present day. And with such numerous and extensive markets for milk as we find within our own borders, cheese-making can at present hardly become a leading branch of dairying in our State, and we need therefore make no special effort in the direction of breeding cows which are chiefly excellent only for that purpose.

Our Massachusetts cow, when we get her, will be equal to all the demands which will be made upon her for cheese-making. But shall we not breed one kind of cow for the milkman and another kind for the butter-maker? I say, No! In the long run, a good article will always bring a better price than a poor one.

I admit that the milk trade of the country is now in a demoralized condition, chiefly because the public have taken it for granted that one quart of good, honest milk is like every other quart of good, honest milk, just as one dozen of eggs in the grocer's market is supposed to represent every other dozen of eggs.

It is but a very few years since milk began to be studied by the public. It is comparatively but a short time since we were first urged to select special breeds for special purposes; since we were told to choose the Jersey for butter-making, the Shorthorn or the Hereford for beef, the Dutch or Hollander for the cheese dairy, and the Ayrshire for the milk-wagon; that, for butter, we want milk, rich in fat; for cheese, an abundance of caseine, and, for the milk market, a superabundance of water. And I think we have carried out this idea of watering our milk, through our cows, about far enough; for you injure your neighbor none the less when you sell him an undue proportion of water added by the cow, than when you sell him that which is equally diluted directly from the pump.

The time must come when milk will have a standard of excellence, and when it will be sold according to its intrinsic value, compared with that standard. Then good milk will bring what it is worth, and the sooner this condition is brought about, the better it will be both for the purchaser and the consumer.

We have been trying to see how poor a grade of milk we could produce and dispose of too long already, and I hope about as long as the market will bear it. I know I am not taking the popular view of this subject, but I believe my position is the true one, and that he who would prepare himself for the future dairy market will strive to breed for a richer quality of milk.

A uniform type of cows for the butter-maker and the milkman would work advantageously for both. I do not suppose there is a milk producer in the State who can really afford to raise his own cows, or who would do it if he could readily buy such as would suit him.

The milk farmer has no milk which he can afford to feed to his calves when young, and for rearing good, thrifty calves, there has been nothing discovered or invented yet equal to milk. The butter dairy affords an abundance of this, and I can see no good reason why all the cows needed in the State should not be raised on butter-producing farms within our own borders. Such a disposition of the milk of a butter dairy, I believe, would bring to the farmers of the State far better returns than if fed, as at present, to swine.

With a uniform breed of cows throughout the State, the milk farmers could generally find a supply of good ones for sale at all times, and butter-makers could be drawn upon, at a day's notice, for any unusual demand in the milk market, while at present they refuse to sell their rich milk at prices which milkmen will pay. Under such a condition, the butter would be made and the cows reared in the more remote districts, where pasture-feed and hay would be cheaper than near the cities. Here breeding animals and young stock could have that exercise which is so necessary to health, growth, and hardy constitutions.

After reaching maturity, say at from five to seven years, the cow could go to the milk farm nearer the city, and do good service for a number of years under the soiling system; and then, while still thrifty and vigorous, be turned into good beef for the city market.

Now, a breed of cows suited to such a system, should be of good size, should give milk, not thin and watery, but rich in fat, caseine, and sugar, should be hearty feeders, so that before they reach far towards the down-hill side of life they may be made into good beef without incurring an unwarrantable expense.

Have we such a breed? Perhaps not, but we have plenty of material for producing such. The Devons might perhaps answer if they were a little larger. Undoubtedly they may be increased in size by a judicious course of breeding and feeding. The Shorthorns, which have been bred specially for the dairy, might do if they could be fined down a little. The breeders probably think they are perfect now. The Jerseys would give good satisfaction, could they be increased in size, and yield a little plumper carcass for the butcher. Good feeding would have a tendency in that direction.

Our Ayrshire friends may claim that they already have just the breed that would fill the requirements; but behind them all, I think the farmers have a breed of animals encumbered by no printed pedigrees, requiring no extravagant outlay of money, and from whose offspring there would be no temptation to save inferior calves because of their aristocratic origin or connections, but a breed to which a rigid system of choosing the best and weeding out the inferior could be applied without causing feelings of sacrifice, as though costly blood were being wasted; for it is a lamentable fact that the inferior calves from our fancy breeds are too often allowed to grow up and bring reproach upon their kind, simply because the owners cannot withstand the temptation to let some one who is too ignorant to choose, pay an extra price above their real worth because of their pedigrees.

I fear I am taking more than my proportion of the time in this discussion, but I should leave the subject unfinished, did I neglect to speak of two other needs of the dairy farmer of Massachusetts.

And first, of feed.

Had the train which brought some of us to Worcester been delayed at a way-station for an hour or two, while the firemen went to the woods for a supply of fuel with which to get up steam to finish the journey, we should all have realized that the time spent there was a dead loss, and should have felt that we were seriously injured, especially if we found that the managers of the road had employed men devoid of the judgment needed for securing the necessary stock of fuel before starting.

Now, if we start at the beginning of the year with a cow or a herd of cows without providing for a sure and constant supply of food for the whole time we intend to keep them, we are in just the condition of a loaded train unprovided with fuel. Yet, what proportion of the cows in the State are fully fed all the year round?

Why, I heard, not many years ago, a president of one of the best agricultural societies in Massachusetts, apologizing to his invited guests at the dinner-table, for the moderate number of animals in the cattle-pens, and gave as a cause for it, that the condition of the animals, on account of the summer's drought, was such that the owners preferred keeping them at home to exhibiting them before the public.

I do not refer to this particular case in a spirit of reproach upon the farmers of that particular locality more than another, for what the president said of their cattle might with equal justice have been said of others through the State, and throughout the whole country, as far as the drought extended.

Now, can we as farmers, or as dairymen, afford to rest our chances of success on the hopes of an extra favorable or even an average season? Certainly not. We must calculate for the worst, and then, if the season proves favorable, our profit will be all the more satisfactory. Just how each one should provide against these seasons of short supply, is a question which each must solve for himself; but if he will set out with the determination to feed his cattle all they need, every day in the year, he will succeed, unless prevented by extraordinary circumstances over which he would be expected to have no control. We are too much in the habit of depending upon the almost spontaneous productions of our pastures and fields for keeping our stock, and we make too little preparation for a reserve force in the shape of green rye, oats or barley, and green-corn fodder grown specially for forage.

We also let our land lie idle too much of the time, when it might be producing some kind of food for our cattle. We get but one crop in a year, when there is ample time for two or more, and thus secure but half the interest on our capital that is due us, while at the same time we are using and paying taxes on double the amount of acres required.

By attending to these and many other sources of waste, we should be able to gain another point that is at present much needed by the dairy farmer of Massachusetts,—that of *reducing the cost of production.*

I have been talking—perhaps you may say dreaming—of the future of dairying in our Commonwealth; have indicated the standard to which I believe we may honorably aspire.

Perhaps my aim is too high for this generation; if so, the object sought is only postponed. It must be attained some time, for people are not always going to buy water for milk, nor eat poor cheese and rancid butter as a rule rather than as an exception.

But to-day we must take things as we find them. If agricultural products are low, are we sure they are not as high as the great body of consumers can afford to have them? If so, then we must continue to produce at present prices, or we drive our customers to the necessity of becoming producers of their own supplies, and, possibly, rivals in our own field.

Then let us imitate the example which competition has obliged every manufacturer to set for us, and endeavor, like him, to produce our goods at the lowest possible cost. But we cannot do this by running our works on half-time, nor by letting half our capital lie idle and unproductive; but we must study our business more, must know it better, and must stop all the leaks. Then we shall have removed some of the needs of the dairy farmer of Massachusetts.

Mr. Gold of West Cornwall, Conn. My friend, Mr. Cheever, invited me to make any criticisms upon the essay he was about to read that I should see fit to make. It is a very admirable one indeed, but there is one point to which I should take exception. He holds the idea that the farmers of New England are going to breed from our native and mixed stock, a class of cows that shall be adapted to all their wants, and that shall be superior to the different breeds that now prevail. In making his argument, he took for granted one point where the exception lies the strongest, that the Ayrshire milk was the poorest in quality and most abundant in quantity of any of the breeds that he named, and of course selected by the milk farmer to furnish his supply of milk for his customers. The Ayrshire breed has been raised for the purpose of having a class of cows that would give an abundant supply of milk of very satisfactory quality for a certain purpose, the manufacture of cheese, and it has been found, in connection with that, admirably adapted for the production of milk to be sent to market. And why? Not because it is wanting in the caseine, or in the butter, or the other constituents that exist in milk at all, but because the cream separates less readily from the milk, and the skim-milk of the Ayrshire, when you have taken off the 'cream, shows by its opacity that there is a large amount of nutritive matter remaining in it. It is opaque, it is white; it is never blue, semi-transparent, like the milk of the Jersey. That is admitted by the breeders of these classes of animals. And he gives credit to the Devon as perhaps the animal that might most perfectly answer that demand. I agree with him that there is no class of cows in the world that gives milk for family purposes, for all the wants required in a family, equal to that given by the Devon. We have it rich in cream, rich in caseine, and in all the elements of milk; but the amount of milk furnished by the Devons is in many families so little satisfactory to the producers that they are not in credit among farmers at present. There have been families of Devons that have been remarkable milkers; but they have been bred with the idea of furnishing good working cattle until this milk-producing habit has been somewhat left in the shade; while the Ayrshire has been bred, and bred successfully, with this very object in view, and for long generations; and the idea that our farmers, at this day, are going to get from the native stock and the grade stock, and compounding those animals, a good and uniform breed, that shall be equal to the chance examples that we have among them, I consider perfectly idle. It would require time longer than any of us have been upon the earth to begin to make any great progress in that direction.

It is well known that any two races will be prolific with each other, but a third, or new race, cannot be formed from two old ones, or two already in existence. This has been tried repeatedly, and never yet succeeded; the progeny will revert to one or both the original types or races. All that can be done in the shape of improvement is to develop aptitudes, and have these become so well developed in a series of generations that they will belong to and become hereditary as transmissible qualities. The hereditary transmission of form is one thing, and belongs to race, and the transmission of qualities is quite another thing, and belongs to intelligent breeding and care.

The difficulties ought not to discourage us from constant effort for the improvement of our stock, it is true; but they should have the effect to control and guide our experiments into practicable channels, and to accept some things as settled.

I heartily coincide with the general character of the essay, but should take exception to that point made by Mr. Cheever.

Mr. CHEEVER. I do not claim that every position I have taken is the best, nor that I have made my own ideas clear. I do not want to be understood that I class the Ayrshire cow as a water cow. The Ayrshire cow, I believe, is the best cow now for the milkman who wants to give his customers good milk. The point I wished most to impress, if I could choose my language correctly, was, that farmers ought to be in better business, and that the market ought to demand that they should be in better business than trying to pick up those cows that give the most milk, without regard to the quality. The point that I wish to make, when I say that one breed of cows is enough for the State, is, that the State is to be a milk-producing State chiefly; a butter-producing State only to a small extent, and that of a first-class article, for the first-class market; that some uniform breed of cows should be kept by Massachusetts, as the Island of Jersey has for ages kept a uniform cow suitable to their wants, one that would be suitable to our needs as a State; one that would combine these two points,—milk good and rich enough, the best that can be produced for the use for which it is designed, the milk-wagon, and, at the same time, milk from which butter of the best quality can be made, that can be sold at prices that will pay for making; made for a class of customers who would not be particular to have the very last globule churned in, if two-thirds of the cream would make the butter better. The Ayrshire, I believe, will do this. The Jersey, as she is now, hardly. I do not know as the Jersey could be a leading breed for Massachusetts, a milk-producing State, because the cream from Jersey milk rises quickly, and leaves what looks blue. It is claimed by chemists and by cheese-makers that the best cheese can be made from the milk of Jersey cows, but that is not what they are sold for. I do not want to be understood, either, that if I were going to fill my yard to-day, I would prefer to go to what we all call, for the want of a better name, native cows and native males, to build up a distinct, separate, new breed, that is not recognized here; but until the prices for the best cows, if we know which they are, come down to the farmer's means, until farmers can decide which of these breeds they will use, so long as ninety-five or ninety-eight per cent. of all the cows in the State are of that unnamed breed, I would have men select their best cows and use the best males they can decide upon for their own special needs. But if there is a breed already started which can more easily be made to fill these requirements, then we should find which that is, and use it, as soon as it comes within our means.

I have a fancy of my own, which I did not mean to speak of here. I would not breed any cow that had a horn. But there is no breed of nohorned cows that fills my demand fully; or, if it filled mine, it would not fill yours. It would not be the cow that I have been talking about. I want the farmers of Massachusetts to have, first, an honest milk market, if they can get it, and then I want them to breed cows for their business. I do not believe that the agriculture of the State is quite on the right track, when we have one man claiming that the Shorthorn is the breed for everybody, another claiming that the Jersey is the breed for everybody, and all these different breeds claimed as the best. I think we are on the wrong track in taking that course for Massachusetts as a State. I do not know as I can make my point clearer by saying more.

The CHAIRMAN. There is a gentleman present from Barre, a practical farmer and butter and cheese maker, who, I know, can furnish the meeting with a good deal of information that will be valuable to them. We shall all be glad to hear from Mr. Ellsworth of Barre.

Mr. ELLSWORTH of Barre. The subject that has been so ably handled is one that is very interesting to us all, and of very great importance to the State, and to all the farmers in the State. The gentleman told us we could make butter in almost any way we had a mind to take hold of it; that it did not make much difference which way we went to work, butter could be made, of first-rate quality, in any way that has been tried. I am aware of that fact myself. But, meanwhile, there has been a great deal of poor butter made in the same different ways. What we want to determine at this time is, how to make the best butter; and I expected to hear from the gentleman how he handled his own butter, but I did not hear it. I am also aware that, in making butter, it makes a great deal of difference how you begin, what kind of a cow you have, and how she is treated. I think he told us that there were good cows in all breeds, and that is undoubtedly true. The Jersey is a cow that is particularly adapted to the production of butter; and you can make good butter from larger breeds, which are better adapted to the production of beef. But that, I think, is not the side of the question which we have before us to-day. If I recollect right, it is milk, butter and cheese, and the marketing of these productions.

Since I have been dairying, the dairy cow and her habits have been the study of my life. I have been handling milk for a few years past differently from the way in which I ever handled it before, and, perhaps, in a different way from that in which it has ever been handled to any great extent,—and that is, by heating it as it comes from the cow the year round, in hot weather as well as cold, and I have made butter and cheese from the same milk. The object of heating was to make the milk perfectly sound, and keep it sound and sweet and perfect, until I carried it through all the processes, and got all I could from it. I have made butter from the milk by first heating it to one hundred and twenty degrees, cooling to about the temperature of atmospheric air, varying from sixty-five to eighty degrees, and letting it stand from twenty-four to sixty hours, according to the weather. I churn my cream sweet, and adding the buttermilk to the skim-milk sweet, I have brought out a very good article of cheese,—an article that is pure, which will break down, and become an article of food that is wholesome, digestible and nutritious, and which gives satisfaction. Such a product as that can be sold for a less price than whole-milk cheese, and to a class of people who can buy it, which, I think, is quite as well as to throw away that product—the skim-milk—as it has always been thrown away. I did not aim to make a first-rate article of cheese. I got all the best of the fat from the milk, made a very good article of butter, and had enough left in the milk to cure the cheese. Skim-milk cheese, with no fat in it, is a very poor article. The country has been flooded with it, but it is a product that is really not fit to put on the market. We used to call it "white-oak cheese," and it is not much more nutritious, or fit to digest, in a common stomach, than chips. That is not the kind of cheese I have been making. The whey from this skim-milk cheese, fed directly, is a good article of food for hogs. I have made some five thousand pounds of pork from my whey, adding considerable meal, however. But it is much better than common skim-milk whey.

As for making milk for the market, if we can sell our milk the year round to the milkman for the price he can afford to give us, we can do better by making milk than any other way. There is no doubt about that. If we could deal with men who would promise to take all our milk the year round, and return none of it, with the complaint that it was sour, whether it was ever sour or not, that would be the most profitable way in which we could use our milk. It makes a great difference whether we sell it the year round, or only a part of the year. At this season of the year, they commence running a car to Barre, to take our milk; but you do not see them running a car up there in June, when there is a large quantity of water in the milk. When there is a large amount of nutritious matter in the milk, they know what they can do. If they do not sell it to the milkmen, they can make butter. The condensing companies can make butter in the fall, and they do not care to run their condenser in June. So, I think, the farmer must keep himself in such a condition, that he can say what he will sell his milk for, and not be obliged to take what the milk-purchasers will give.

The butter business has increased very much the last year. There has been nearly six times as much butter shipped this year as there was last, in the same time. That speaks well for our export of butter. I helped build the second cheese factory, I think it was, in Massachusetts, and I remember that on talking it over with our farmers, they said at once, "If we all go to work making cheese, we cannot sell it; there will be no market for it." But you are all aware of the number of cheese factories that have grown up from that time to this, and yet cheese now sells in New York better, probably, than any other product that the farmer raises. It is just so with butter. Butter factories have increased all over the United States about as rapidly as cheese factories, and still there is an outlet for butter, and it brings a very fair price. We do not all get the highest price. A few get an extra price, but they do not get more than they ought to have. It is claimed by many that we ought not to get seventy-five or eighty cents a pound for butter; that it is not worth it. Well, whether it is worth it or not, we all know that a piece of butter as big as a walnut, just right to come on our table, is worth more than a piece as big as a hen's egg that is not just right; and if it is as big as your fist, if it is off flavor, I do not want it. So, when a dairyman makes a nice article of butter, and delivers it fresh from the churn, twice a week, or once a week, as may be,—perfectly sound, sweet, fresh butter,—he will get his price for that butter, always. That will not drop off. We would all like to have that, but as we cannot, we will take the firkin butter. We cannot all get that kind of butter, even at sixty cents a pound; so that I think there is no danger of overstocking the market if we continue, as many of us as can, making cheese and butter.

Whole-milk cheese, that is made with all the fat in it, does not keep as well as cheese made of milk from which a small amount of fat has been taken. I have been told by chemists that an excess of fat will throw it off flavor unless it is perfectly made. There is but a small amount of cheese in the United States at the present time that is perfectly made, that will stand six or nine months' keeping. Most of the cheese that now goes to Liverpool as American fine cheese comes to maturity in ten days; is fit to ship and be called nice cheese in ten days from the press. That cheese would not be fit to be called a fair quality of cheese in three or six weeks, so that there are a great many ways to handle cheese and get it on the market as quick as possible.

Dr. Loring. I have listened with the greatest pleasure to the paper which has been read here this afternoon by Mr. Cheever, upon the question, as I understand, now under discussion,—milk, cheese, butter, and the dairy generally. There were a great many good suggestions in his paper; there were some intimations which I should hardly agree with, and which he has said were simply intimations brought out by the haste with which his paper was prepared. But, gentlemen, the dairy itself, and the position it occupies in the agricultural community of the world, is really one of the most interesting questions that a farmer can discuss. You know perfectly well that you can turn your attention to the specific crops of any land, and if you apply ordinary intelligence and skill, you may be perfectly sure of reaping your reward. The market gardeners around Worcester, if they apply their labor skilfully, are sure to be compensated for that labor. He who grows tobacco in Virginia knows that when his tobacco crop reaches the market, it will usually compensate him for the labor bestowed upon the crop. The sugar grower and the cotton grower of the South, accommodating themselves to the soil which they cultivate and the latitude in which they live, and adapting their products to the markets they intend to supply, know perfectly well that they will generally receive an ample reward for their labor and their capital. That is patent everywhere. But to the man who devotes himself to the business of the dairy, the question becomes much more uncertain and the results much more problematical, and so we must govern ourselves by the best information we can obtain on this question, with the entire understanding that even with the best designs and obedience to the best laws, we are liable to meet many difficulties and obstacles which would seem to be almost insurmountable.

It is a curious fact, that the dairy section of the world is a narrow section. I mean to say, that the belt of land which is devoted to the dairy is a very narrow belt. It is confined almost entirely to the northern portion of the temperate zone. The arctic regions and the lands at the equator have no dairy; nor have the southern portions of the temperate zone. It is those latitudes that lie along the northern portion of the temperate zone which are adapted to the dairy, generally. Now, I think we can deduce from this a very excellent law to guide us in our work. We know perfectly well that the extremes of heat and cold in this belt of land of which I have spoken, must generally be avoided, in order that the dairy may be properly managed. In the extreme heat of summer, the same difficulty exists with the dairy in the latitude to which I have alluded that would exist in the tropics. It is almost as hard to make butter in Vermont in August, as it would be in Louisiana. The condition of the climate, the condition of the feed, the condition of the animal itself, are such, that the processes of the dairy can hardly be carried on, and it is the mean temperature of early summer and of early autumn, in the latitude of which I have spoken, which is peculiarly adapted to the production of milk, butter, and cheese. Now, we live in that latitude, we live in that belt, and to us especially it is of the first importance to develop, as far as we can possibly, some definite laws in regard to this business.

I conceive, therefore, that there are two laws which can be laid down, if I can express them definitely, that may possibly guide us in our work. In the first place, the condition of the animal economy. A perfect condition of the animal economy, not pinched by cold, nor weakened by intense heat, is necessary for a good dairy. Take a cow in the month of June,—a cow adapted to the dairy,—and her physical condition is entirely in accordance with the physiological processes going on to enable her to eliminate from the food she takes the largest and richest amount of milk. There is no portion of the animal economy so sensitive as that which a dairy cow employs in the production of milk. There is none so easily affected by heat; there is none so easily affected by cold; there is none so easily overthrown by accident; there is none so easily destroyed by excessive muscular exertion. The fat-producing functions or organs of the animal generally, perform their duties with perfect ease. They are those organs which enable you to fatten a hog at almost any season of the year. They are those organs which enable you to raise Shorthorn beef readily. A cold day, or a hot day, or a thunder-storm, does not affect a Shorthorn bullock in the manufacture of beef; nor does it affect a Suffolk pig in the manufacture of pork. But the organs which a dairy cow uses in the manufacture of milk are so sensitive and so nicely balanced, that a thunder-shower suddenly coming up will throw them out of gear; exposure in a hot day will affect them; a north-east storm will affect them; a blow struck by a harsh attendant will affect them; a bad, stupid, or blundering milker will almost destroy the capacity of a dairy cow. I say this to show you how sensitive this organization is, and how necessary it is that the animal economy should be in the healthiest possible condition in a dairy cow, in order that she may produce the greatest amount of milk, and the best milk from a given amount of food. So I say that the first condition is, that the animal economy should be in perfect order, if you expect to derive from the dairy cow what you ought in order to make her profitable. She must not, then, have too much exercise in feeding; she must not be exposed to intense heat; she must not be exposed to intense cold. When Mr. Cheever told us that it was more difficult at a certain time of year to convert cream into butter, I thought, as far as the cow herself was concerned, I understood somewhat of the difficulty. I do not think it is possible for a cow to be half frozen in midwinter, her stable covered with frost, the thermometer far below the freezing point, with nothing but ordinary hay before her, to keep her animal economy in such condition that she can in any possible way create milk that is capable of making good butter. In order to keep herself alive, she is continually drawing upon her fat-producing functions and organs, whether they are devoted to the manufacture of cream, or of that adipose matter which constitutes an accumulation of fat. She is continually drawing upon these organs to keep herself warm, and how can she make milk, under these conditions, of such quantity and quality that she shall be a profitable dairy cow? I do not think it is possible for a cow, which, for a period of twenty-four hours is exposed to intense cold in the winter time, to produce milk that is capable of being manufactured readily into butter.

I think I am right in this. When, therefore, I am told that it is difficult to manufacture butter in the winter season, I must know, in the first place, where the cow stands, and how she is fed, which is called upon to make the cream out of which that butter is to be made. If I find her exposed in a cold stable, with the doors half open in the night-time, and with wide cracks behind her, so that she is shivering in the morning, I am pretty sure that the cream made by that cow cannot be readily converted into butter. If you wish, therefore, to overcome the difficulties in the winter time which have been so well set forth by the lecturer this afternoon, you must be sure that your cow is kept in proper condition, and fed with food which does not chill her. Let her water and her food be warmed, and under those conditions, you may be sure that a cow which is a good dairy cow in the month of June will be a pretty good dairy cow in the month of January.

Speaking of this matter of warming food, I desire to state a little fact that came under my own observation last winter, which confirms the statement I have made. I am running a milk farm. I introduce no water into my milk except what my cows drink. I have made that a rule. A year ago last autumn, I introduced into my yard and barns the water from the water-works of the city of Salem. I had had water in my yard from a brook, I had had wells, etc., but I introduced this water thoroughly through all my farm-buildings, barns, stables, and farm-house. In the course of the winter, when the weather was very severe, I had a boiler so set that it was easy to draw water from it into the drinking-troughs where the cows drink daily; and when the weather was intensely cold, I requested my foreman to supply these troughs with an abundance of warm water. He soon found that the milk of these cows was increased more than ten per cent.; that in cold weather, on account of the care which he was led to take in watering those animals with warm water, care which he did not take in milder days, he increased to this extent the flow of milk from them. It was water as warm as the water in a pasture in the summer season, and the animals appreciated it accordingly. That fact strengthened my faith in the law that I have been laying down in regard to the animal economy.

Now, having said as much as I have in regard to the animal economy and the proper conditions for a dairy cow, I think every farmer will agree with me that you must not expect a chilled and half-frozen cow to supply you with cream, or even a liberal quantity of milk, in the winter season. You cannot, moreover, make butter in midsummer, when the heat becomes excessive,—in August or late July weather. An enervated cow, dragging herself up from pasture in dog days, is not in a condition to give good cream, and you need not expect to have it. And so everybody will tell you, "We have got a supply of June butter, of September butter," made when the animal economy was in the best condition for the production of cream, at a time when the cow was not pinched by cold nor enervated by heat, but was in a sound, strong, healthy condition.

I think we can hardly expect, Mr. President, to make good butter, moreover, from cream that has been frozen. Mr. Ellsworth stated a very remarkable fact with regard to his preparation of cream for butter, when he said that he scalded it, heating it, as I understand it, to the temperature of one hundred and twenty degrees. I hardly understand that, unless it facilitates the rising of the cream. It may be that the heat drives the cream rapidly from the milk. That may be the object of the process, and that gives him what he so properly calls "sweet skim-milk." But I am perfectly sure that milk should not be exposed to intense cold if you expect to get cream from it, nor should it be exposed to long-continued summer heat, which to a certain extent decomposes it. I think that cream should be preserved in about a uniform temperature, and we can never expect to get the globules of the cream in a good, sound, healthy condition when they have been exposed to long-continued heat. I do not say to *scalding;* I say long-continued heat, say during the twelve hours in which it rises; or exposed to such intense cold that it freezes. I think every dairyman will agree with me that the cream globules are broken down by both these influences; first, by the frost, and secondly by the decomposition which attends the application of long-continued heat. So I would have the milk preserved from those influences. I think that the milk from a cow fed and kept warm as I have suggested, and itself kept at about the temperature of sixty degrees, will almost always, at any season of the year, produce a nearly uniform good quality of butter. I submit this to the gentleman who read the lecture, who has more time than I have to investigate these matters, as a suggestion out of which he may find some remedy for the difficulty which he has so well set forth.

So much for the condition of the animal economy, and so much for the condition in which cream should be kept during the time when it is to be prepared for the manufacture of butter. In regard to cheese, I desire to say to the gentleman from Barre, that I fear no wholesale manufacturer of cheese will ever come up to his old domestic standard. I have had two cheeses presented me by the farmers of Barre. One was given me by Mrs. Ellsworth, whose courtesy and hospitality I shall always remember with the most profound gratitude. It was a cheese made in her own house, by her own hands, and ripened as she knew how to ripen it. That was a cheese whose quality and flavor rest in my memory still. The other cheese was presented to me by the cheese manufacturers of the town of Barre, as a specimen of the products of their factories. It was a factory-made cheese, and a very excellent result it was of factory manufacture. I tried with all the skill that I had to bring that cheese up to the genuine Ellsworth standard, but I never got it there. Somehow or other, it was a little too strong, or a little too sharp, or there was something about it that was not just right. I never could ripen it up to the standard reached by the products of our best domestic dairies. So, I would say to you, when you want to get the perfection of cheese, pass directly by the door of Mr. Ellsworth's cheese factory, and introduce yourself to Mrs. Ellsworth's dairy-room, if she still has one, and then you will find out what good cheese is. I do not say this to disparage the cheese factory, or to intimate that, like Peter Pindar's razors, factory cheese is made to sell, but simply with the hope that the manufacture of cheese in the factory will be brought to a uniform degree of excellence, as high as the best of those brought out by the most skilful dairy-woman before the factory was established.

Now, with regard to the suggestions that have been made here upon the question of the New England dairy cow. It is a very important question, and many of the statements made by Mr. Cheever are perfectly in accordance with my own views. But I want to remind him, that the best cows in New England that are called "native" cows, are those which, for long generations, have been adapted to our soil and climate, and have descended from some of the best recognized breeds. If you take what are called "native" cows, you will find that many of them (Mr. Cheever will excuse me for saying it) are "hampered with a pedigree" and when we get them back to the best recognized families, then we find out what their merit is. And it is surprising, too, how the soil and climate of any section will arrange the animal economy so as to suit its conditions. For instance, in Essex County, we have had a great many Ayrshires introduced, both pure-bred animals and grades, and they have laid the foundation of the most admirable dairy herds we have; and I am inclined to think, with all deference to the opinions of others, that a good cow, a well-balanced, well-organized, good dairy cow, converting all her food most profitably into the products of the dairy, is what would usually be called an Ayrshire cow. I give her that name because I cannot hit it in any other way. I mean to say that the cow that has the best head, the best neck, the best shoulders, the best ribs, the best hips, and the best lacteal functions for the dairy, is what is usually known as an Ayrshire cow. That is the rule. Now, you come into Worcester County, and what do you see here? Long ago, there were introduced into this county what were known as Durhams, or Shorthorns. The climate and soil here have brought those animals into the organization and condition of Ayrshires. And when I have myself examined the herds of cattle in the region in and around Barre and New Braintree, and have found cows of about that proportion, size, shape and color, which I should value in my own Essex County herd as an Ayrshire cow, and have said to the owner, "What will you take for that cow?" the reply has been, "I don't want to sell her. She is a good deal like an Ayrshire." I have heard that over and over again. The gentleman from Barre (Mr. Ellsworth) knows it. They are born a good deal like Ayrshires. The soil and climate have brought about a condition of the animal economy in the Shorthorn, or Durham, which is analogous to that of a good dairy cow, the animal to which the Scotch farmers and breeders have devoted so much time and attention. The Devon, under ordinary influences, graded on other breeds, will produce somewhat similar effects.

I do not mean to say that pure-bred Devons will do it, because they are not dairy cattle, and are not claimed to be in England, where they are bred for beef purposes. There, the Devon is one of the finest beef animals in the world. A Devon breeder who called on me two or three years ago, told me that a four-year-old steer often dressed for Christmas beef fourteen hundred pounds. He said they were bred solely for beef purposes. Yet the Devon, in certain parts of Connecticut (just as the Shorthorn and Durham in Worcester County and the Ayrshire in Essex County) intermingled with dairy breeds, has produced almost as good a dairy cow as we have in New England. That somewhat broad-horned, well-shaped red cow, with a white end to her tail,—everybody knows her, —is about as good a cow as you can find. And what is quite remarkable, she resembles, in color, shape, and size, the best imported Ayrshire bull ever brought into New England. That shows you, does it not, the correctness of that statement of mine, that you can generally wind up the description of a good cow, of any grade, by saying, "She is a good cow, for she looks like the Ayrshire"?

It is exactly so with the Jerseys. You get a pure-bred Jersey, and she is as delicate as a child, almost; but you can put that strain of blood into other breeds, to such advantage that I have seen many and many a grade Jersey cow, which, in general conformation and condition, was so analogous to an Ayrshire that you would say, "Why, upon my word, those Ayrshires must have some Jersey blood in them, after all." You know, sir, that we can make Americans out of any nationality in the world, if you will only give it time enough to get a foothold on this continent. I have always said that the American blood was the most cosmopolitan and all-absorbing blood known. So I say that the Ayrshire cow, as a dairy cow, is the most cosmopolitan and all-absorbing cow on earth.

Now, a word in regard to the feed of these animals. I have so often stated the law in regard to the feeding of dairy animals that it seems hardly necessary to repeat it again. I think that law is, so to keep your animal that is to be engaged in the business of making milk, as not to rouse to undue action the fat-producing functions at any period of life. For instance, take a yearling heifer that has been kept in full-beef condition up to a year old, and her life has been so devoted to the business of making fat that it seems as if the fat-producing functions had overrun the milk-producing functions, and the chances are that she will not be worth a dollar when she takes to her business and work as a dairy cow. It is almost invariably so. I would feed, therefore, with special reference to the business in which the animal is to be engaged. If I were growing a Shorthorn for beef, I would keep him growing all the time. If I were growing a dairy cow, I would feed with special reference to that part of the animal economy which has to do with the production of milk. I would keep the calf growing moderately, not overloading it with food of too nutritious a quality. I would not give it any great amount of oleaginous food, but keep it mainly upon hay, with oatmeal, and perhaps a little corn-meal when necessary. I would keep it growing moderately. I would not stop it, but I would not give it any food that would appeal to its fat-producing functions, endeavoring always to keep in mind the object in view, that when the animal grows up, it is to be a good dairy cow.

I think, if this law is followed, not only can the breeds which are now recognized as dairy animals be improved, but that a great improvement can be made in the general average of our natives, and that the first step will be taken toward accomplishing what Mr. Cheever has so well alluded to this afternoon,—the production of a good, substantial, well-fashioned Massachusetts cow, not singly, but in herds.

I have said, gentlemen, a great deal more than I intended when I took the platform, and a great deal more, I have no doubt, than you desired to hear. But it is a great pleasure, I desire to say, to meet you again, and I am sure that in whatever business I may be engaged, I shall never, unless absolutely necessary, absent myself from the meetings of the State Board of Agriculture of Massachusetts.

Adjourned to seven o'clock.

EVENING SESSION.

The Board again met at seven o'clock, Dr. LORING in the chair, who introduced as the lecturer, DONALD G. MITCHELL, Esq., of New Haven, Conn.

THE FARMER'S HOMESTEAD, AND ITS RELATION TO FARM THRIFT.

BY DONALD G. MITCHELL.

We may as well begin at the beginning, in this matter, and talk, *first*, of the proper situation for a farmer's homestead.

It must be convenient, of course, and, to this end, centrally placed; not too near the highway, lest it forbid all homely privacy, and not too far away from it, lest it involve the costs of private road-making and of repairs, which, on many farms, foot up uncomfortably large. The shelter of some flanking hill is an excellent thing; but this may be gained by adroit establishment of outbuildings, by an old wood, or by judicious planting. Dryness of site, and facilities for drainage, are indispensable. I think it was Thoreau who said that it was safe to build where a woodchuck dug his hole. He certainly never runs the risk of having water settle in it; he gets in a good lee, and he secures a chance to bask in the sun near by. A permanent, good view is worth having; but it is paying too dear for it, to climb to the top of a windy hill. The high-road is a good neighbor, as I have said, if well kept; but the frontage of a house, in the country, should not be governed by it. There may be a passer-by you may like to look out for; but whoever it may be, the sunshine is a better man than he, and the best windows should be opened to him freely. The outer doorway, through which inmates pass oftenest, should have a sunny aspect and a lee of shelter. Northern doors, unprotected, and where ice forms easily upon the step, and an aguish blast smites every outgoer, are great breeders of domestic wrath, and the man who tolerates such deserves —what he is sure to get.

Easy access to water is, of course, a matter of prime importance in determining site. A spring, which will take water into the house, is best of all; a near brook, which will admit of the same result,—by a ram,—is next best; and an unfailing well, next. Of the adequacy of such supply, and of dealing with it, I shall have more to say when we come to talk of the interior.

Second. After site is determined, the question of *material* is in order. Wood is cheap, is manageable, is dry, and, with watchfulness and renewal of paint (which is, in fact, a minute coating of earth and oil), will last many years. Old timber-houses of the fourteenth and fifteenth centuries, in many parts of Europe, are still habitable. It is needless to say, however, they were substantially built, and most of them filled in between the timbers with mortar. This device has never been adopted with us, nor, though picturesque, is it commendable in our climate; the fierce suns of our summers occasioning such a shrinking and swelling of the wood as displaces the masonry, and opens gaps between it and the timber. If wood is adopted, it is an excellent provision against cold, as well as against heat, to fill in between the studding with brick, as in many of the old colonial houses. In lack of this, the heavy sheathing-paper should be used under the exterior covering; or, what is still more effective, the walls may be back-plastered,—that is to say, lathing should be cut in between the studding, and a rough coat of plaster applied, in addition to the final wall of plastering, some three inches removed from it, and set up in the usual way. Such precautions are especially desirable upon the exposed sides of a house. We do not take enough account of difference in exposures; the very trees should teach us a lesson,—the bark is thickest upon the north side.

In many parts of the country *concrete* houses have latterly come much into favor, and there is a great deal to be said for them. They admit largely of home-work and unskilled labor, the chief matters of importance being, that the lime or cement should be the best, the sand sharp and coarse, while the filling may be of pebbles, small bowlders, or, still better, the debris of a quarry. The rougher the exterior is left, if only uniform in surface, the better the effect.

An advantage urged in favor of the concrete house, is, that it admits of plastering directly upon the interior surface, thus operating a great saving of labor and of space. I should, however, hardly count such a procedure wholly safe, except there were a wide projection of the eaves, and a twelve-inch course, in best water-cement, laid throughout the building, two feet above the ground.

The popular idea with regard to a stone house in the country is, that it involves great cost in the shaping of the material, and that it carries with it an unhealthy dampness. Where such dampness exists, it must be due to faulty construction. Our cousins, in England and in France and in Italy, have been living quite safely in stone houses for a great many centuries; and the great cost alleged is due to such hammering of the stones, or to such an over-smoothness of exterior as are no way essential to a good, a substantial and a picturesque farm homestead. There are thousands of acres in New England which have stones scattered over the fields, which must be removed for easy tillage, which ordinarily go to the construction of fences, or to lumber the sides of highways, and which would furnish effective material, of varying tint, and without a hammer's stroke, for the walls of a substantial house. If those of regular angles are lacking for the corners and jambs, hard brick may be substituted, which, so far from offering ugly contrast, supplies the very one which they are just now seeking for some of the elegant villas of Newport, and which belongs to some of the most venerated old country houses of England. A strip of blue stone will make sills, and, for lintels, nothing can be stancher and more secure than well-seasoned oak or chestnut timber.

Some sixteen or seventeen years ago, I had occasion to build a small, one-story farm-house of some fifty feet in length by twenty-seven in width, and used in the construction the stones nearest at hand, being a bit of old fence which it was necessary to remove. The stones varied in size from the bigness of my fist to those eight or ten inches in diameter. The windows were thrown two into one, to avoid cost of unnecessary jambs; and these jambs, and the angles of the building, were of brick. The gables were constructed of wood, and overhanging the end walls by a foot or more, thus enlarging the area of attic-floor and lessening cost of construction. This building, whose walls are as stanch and strong as on the year following their completion, was executed at a cost of only $1,500, and a like sum would almost cover it now. No building could be drier (of course, it is furred off some five inches within), none could be warmer in winter or cooler in summer. As for exterior, it has, certainly, a homely roughness, which, I must say, I like, as a protest that will stand against over-nicety.

Another building which I had occasion to erect within four or five years, of larger size, is of the same general character, though the stones—still ordinary field stones—have been culled with more care, and the pointing more considered. In this case, a second story, of wood construction, overhangs the first story of stone, and the chambers, thus being inclosed by wooden walls, are, I observe, very satisfying to those who cannot get rid of the old-fashioned prejudice, that stone houses are, of necessity, damp. I have ventured to bring before you this record of personal experience, in order to show what may be done practically with very much of the rude material which is lying about our fields. Those who insist upon extreme nicety—which I think a very needless thing in the exterior of a country homestead—might not be satisfied with the result. But the work is strong; the walls will endure; they mate well with any landscape; they involve no constantly renewing bills to the painters; age will mellow them; the vines take kindly to them.

As for architectural style, whether of this name or that, I think the less we worry about it the better. If we build for good light, good air, good room, with windows where we need them, chimneys where we need them, and porches where they will be of real service, and if we could resolutely do this, without cramping our wants to an architect's whim, or to what he or we consider "style," I think we should come to an honester and a better architecture. A broad, well-pitched roof, and generous-sized chimneys, are full of homely, hospitable expression, and are commended by the best of practical reasons: such a roof disposing easily of snows and moisture, thus lasting well, and offering security against heated chambers; and generous chimneys admitting of those multiplied flues, which, with their fireplaces in all the chief rooms, provide for the best of ventilation.

I know there is a sort of economy which suggests adherence to conventional forms. Your builder has drawings (such as they are) of your neighbor's house; he engages to build one like it, with a few minor changes, and you have no bother with plans and their costs. But in a home where we and our children are to be established, and to form habits for life, and to put in shape our ideas of order and propriety and convenience, we want a good fit. To secure this fitness, it is quite essential that the homestead be planned and take shape from the inside, and not, as in too many cases, from the outside.

Now, in nine cases in ten, in determination of the arrangements which go to make up the fitness I have spoken of, the wife will be the better judge, and it is she who should hold court. Housekeeping in a farm homestead involves, at best, a great deal of serious care and toil, and she who bears the brunt of it should be put in possession of all those aids that lie in easy juxtaposition of kitchen, pantry, stairs, presses, bath-room. Whatever lessens the grosser labors in the homestead, civilizes and refines. The farmer is eager to lay hold upon whatever will lighten his work in field and stable. He does not keep to the old snathe, when he can put his horses to a Buckeye. Is he eager as he should be to multiply aids indoors? Take the water-supply, for instance; there is no good reason, in this day of hydropults and of force-pumps, why every farm homestead should not have its abounding supply of water flowing into it, above and below. I would not, indeed, advise such congeries of pipes as belong to the town-houses, ramifying all over, exposed to every sharp change of temperature, and involving attendance of those most expensive of visitors—the plumbers. But one pipe, near a flue, and away from outer walls, with its proper attachments above and below, and fed from a tank under the roof, supplied by force-pump in well or cistern, or from a spring, would, at small cost, give respite to many a weary one. All that relates, too, to fuel, lights, and that dreadful harassment of "washing-day," should be improved, and made easily manageable by all the devices that town civilization supplies. There is no possible reason for our living in the country in 1876 as we lived in 1826. We cannot, indeed, have gas in the farm homestead,—except what the campaign newspaper brings in,—but with abundant kerosene, and the improved lamps, we may have that best of civilizers, a full flow of light. But after all, the best light is sunlight, and of that there should be good store; most of all in the room which is the living-room and the home-room. And whatever may become of parlor or of keeping-room, the living-room should be the sunniest, the largest, and the cheerfulest of the whole house. Parlor means talking place; and if you must have a starched talk with your parson, a room ten by twelve is big enough for that; and if you must have a private gossip with a gossipping neighbor, a room even smaller is big enough for that. Better, by all odds, that your living-room were such as to entice all comers, whether parson or gossip, and that they should delight in its largeness and homely cheer. Kept rooms, curtained and fine, and hung with photographs, and smelling of the varnish of new furniture you never use, are dreadful places. In the country, and everywhere else, they smack of funerals, or of Dorcas societies, or of that starched ceremony which is one of the worst country importations from the town. Above all things, a good, honest farm homestead should have the air of being "lived in" all over.

The farmer, from the necessities of the case, must be very much at home. Whatever social growth or ripeness he may come to, must be found *there*. Husband and wife are very much thrown together. The resources in the town for "evenings out," are not at his command. If the butter will not come, or if he has forgotten to put that glass in the kitchen window, he will be very likely to hear of it! So, too,—for almost everything has two sides,—if the heifer has kicked, or if he has bought a spavined horse for a sound one, the mistress will find that out,—and the humor bred of it. There are no such lightning-conductors in the country as one encounters at street-corners in town—good, stolid fellows of the opposite party—upon whom you can vent your spleen. Everything comes home in the country. It is amazing how much a contented wife and family—contented by reason of the cheery surroundings—will take the gustiness out of a man, and stimulate his better endeavors; and it is not at all surprising how much a discontented, querulous temper, that is bred of a meagre, ill-ordered, dingy homestead, will keep a man's spleen at fever-heat, and take all the bloom from his enjoyment of life,—no matter what may be his successes out of doors.

I think a good word may be said for the farmer's larder, in connection with the homestead. All nationalities, in their growth away from barbarism, leave no more striking evidences of advance, than in their modes of eating, and variety and treatment of food. The days are changed since Peter the Great grappled in his fists a knuckle of venison to satisfy hunger. The farmer's larder ought to be full, and full of good things. If he grows them, he may surely test them. He ought to know a yearling Southdown haunch from a pinched loin of an old Merino. He will need stronger meats than the man who keeps within doors mostly; but they need not be gross. I think we incline to too much of grossness in this,—making light of that larger variety, and those multiplied delicacies which confront us in town. I think we might well substitute tender and luscious fruits for some of the heavier puddings and indigestible pastry we incline to. There is no good reason why crisp celery, mushrooms, and other such delicacies, not more difficult of growth than a tobacco crop, should be given over wholly to townsfolk; and, if a brook is available, nothing is simpler than to have a stock of trout at command. Such appetizing dishes will commend the table to sons and daughters returning from school or city. It is not essential to farm thrift that we limit ourselves to pork and corn-bread, royal as these are in their places, nor should poultry be kept back for the market only. A good broiler of Brahma or Dorking, if always "put in the place where it will do most good," should surely find its way, sometimes, under a farmer's jacket. We want to live up to the level of our work, and of our produce, to get an appreciative sense of what it is really worth. We expect a clergyman to live up to the level of his best preachment; we don't wish our legislators to ignore the laws they make—except for back pay. We don't expect tailors to be ill-dressed, nor should a farmer's homestead fail of being well stocked with those riper delicacies, which, with his improved breeds and new fruits, he is multiplying every year for the denizens of towns. Whatever civilizing influences—and who shall say they do not exist?—may belong to improved marketing, belong, of right, and in fullest reach, to the well-appointed farm homestead.

I come now to a very brief consideration of those interior fittings of the farmer's homestead, which are more especially under the control of the mistress of it; and if I might venture to address a word to these "parties of the second part," it would be to say, that while you secure all the needed conveniences and appliances for comfort, from patent wringer to hot water at command, by arguments you can best use (and which the master had best listen to with docility), you set your faces against such flimsy finery of all sorts as will bear no honest, every-day handling. All material furnishing should have such simplicity and strength as will invite use and ensure comfort. Showy upholstery trappings are the poorest things in the world to make a house really livable and cheery and inviting.

Do not burden and chill a homestead with too starched a law of order. If, in the living-room, the goodman wants his desk, humor him; if the cat wants a lounge, humor her; if some fussy, but kindly, Aunt Tabitha wants her rocking-chair, do not say nay to this. Do not lay down any dreary and unflinching law of proprieties. Do not stickle for absolute agreement of parts; let there be motley, if you like it, or can put it to good, honest, every-day enjoyment. An old settle, well-cushioned, if you like; a home-wrought rug, if you choose; a grandfather's elbow-chair; an open cupboard in the corner, or in the wainscot, for the display of your best china. Many of these things happen just now to be a fashion of the city, so that, in thus decorating a homestead, you will be "in the style,"—a miserable argument, I grant, and not worth considering for a moment, except real service and convenience sustain their use.

Give flowers a chance to wanton in the window. Remember that, in your woods, you have ferns and mosses, easily accessible, which are a passion with those who can hardly secure them in the town. Let vines, too, toss on either hand and embower your winter's look-out. These things will cost only the lightest of care, and they will be needful, with many other simple decorative features, for your daughter's delight. You cannot send her to such schools as we have now,—schools whose studies enlarge and refine every faculty,—without somewhat more to feed her new-born appetites, and the new ranges of an imaginative and inquiring mind, than the old bareness of room and wall and window.

There may be something in the furnishing to stamp it as a farmer's homestead. If you have some rare specimens of maize that you are proud of, show them; hang them over the mantel; group them, with rare wheat or barley heads, into an ornament that will be richer than any the upholsterer could devise. The grasses, both wild and cultivated, may be preserved and arranged as not only to make a charming decorative feature, but to serve as specimens whereby to determine any question of habit or name. So, too, if you have rare fruits, and your daughters are studying—as they do in these times—the art of copying them in wax,—a very delicate and pretty art,—place them on show as trophies. Or, perhaps, the same daughter, or a boy with a taste for natural history, has a knack (easily learned) of stuffing birds; in which case you cannot have a better ornament than a well-mounted owl, or a brace of quail, or a group of our commonest songsters. Then there are the wonderful things to be done in colored leaves and rustic-work in twigs,—all charming, and, if you come to that, bearing their price in city shops, and eagerly sought for.

Now, such things in the homestead not only carry an essential grace, but demonstrate a pride in the country life, and a determination to have familiarity with it, and knowledge of it, and carry, furthermore, evidence to all cultured people who enter your homestead, of the opportunities within your range of life for linking happily together minute knowledge and a refined taste. To a home of such belongings, children coming back from schools of whatever sort, will not find their minds starved by contact with bareness, but piqued and gratified and stimulated by its fresh and suggestive aspect. In gone-by times, there were something coarser ways of finding entertainment. There were the husking-bees and apple-parings,—easy, jovial, kindly, in which young people all participated with glee. Well, your daughters now, do not want to take their tournures and trains into a barn. They have come by schooling, reading, lecture-going (if you please), to a different level. They perceive that the husking business is given over to a different set of fellows, who do it for two or three cents a bushel, and "be jabbers, are as good as iver the nixt jintilman."

We cannot declaim against this new aspect of the family. We cannot take our female country population out of their new plane,—out of their bustles, and land them in gingham aprons;—ask your wives if we can! The old social zest that lay in a pleasant coarseness will not come back; but we can lay the basis of a new and riper social zest, in making the homestead, or its equipments, level with the education of the day.

I could have wished, had time allowed, to say something of the surroundings of a farm homestead, and how proper disposition of shade and shrubbery and walks may be made to contribute to that cheery, comely air, which educates the young, and which contents the old. But in these matters, no more than in the fittings of an interior, would I urge an over-finical nicety. I would not urge flowers, because such and such colors are "of the style," nor paths trimmed and rolled with soldier-like precision, nor turf shorn to the eighth of an inch; but I should say trees where you want shade or shelter; shrubbery where you want a screen; flowers where they are a positive delight to you or your friends, and where you may cut them at will; walks for a positive convenience,—always dry, if not geometrically true, and always leading where you want to go, and not foolishly trailing, under the hands of town gardeners, where you never want to go.

Again, that portion of the high-road which is the farmer's own should be looked to with care. The roadside is his; rights of travel over it do in no wise take away his proprietorship. To the eye of the world, it gives the first and main test of his neatness and order; if he abuses it, he abuses himself,—a sort of self-abuse that I think our legislatures should compel him to forego. There are townships in New England which carry a barbarian look, by reason purely of the uncomely stones and offal dumped upon either side of the high-roads. It is needless to say that strangers are disgusted, and the marketable value of adjoining lands sensibly depreciated. Yet there are money-getting farmers, credited, I dare say justly, with a coarse kind of "horse-sense," who clear the fields, and, year after year, thus barbarize the highways. In villages, they would not dare it; but in remote places, nobody sees, nobody cares, having grown up in such savagery. Now, I think every farmer should treat his homestead and its surroundings as if the world were to see it. I think every man should live as if the world were to see him and his work; and for that matter, every woman, too.

Speaking of looks, reminds me that it may be urged, by some overbalanced utilitarians, in regard to all the topics I have brought forward, that they have no positive economic and practical bearing; that they look, after all, to improvements only in the general aspect of things,—to appearances, in short. Well, all I have to say to this, is, that civilization, in every step of its progress, must leave marks of its advance; and these marks of a progressive civilization are in every land, and with every people, indicated by just such improved appearances as I have brought to your notice. They are the evidences of comfort, of culture, of wise thoughtfulness, of the best sort of thrift. Science and skill and industry, as they work out their triumphs in farming or in anything else, and enlarge resources, and widen the range of action and of thought, ought to have expression in the whole tenor of a man's life. We want, if we want to do the best with a farmer's life and a farmer's calling, to make its every-day home associations mate fairly with the best homes everywhere,—mate with them in substantial comfort, in order, and in good taste. We want, most of all, to demonstrate with reference to our farm-life at the eastward, its range for the development of a full and well-rounded manhood and womanhood; with graces of its own, and opportunities for culture of its own; and that the prevailing disposition to esteem it bare and dull, has no foundation in the inevitable conditions of that life. And nothing will more surely make this clear as such a well-appointed homestead as I have figured, and which is within easy reach of every man and woman who sets earnestly about its establishment.

With such a homestead made good, with children cheered by it and proud of it, with wife contented in it, the farmer has surely won one of the largest results of a wise thrift. And if it passes away from him, or he passes away—in the final harvesting—from it, he may feel assured, that, though he may not have lived an altogether good life, he has, at least, left on record—a GOOD SERMON.

At the conclusion of the lecture, the members of the Board and others attending the meeting, by invitation of the Worcester County Horticultural Society, repaired to the library-room, where they were met by several of the prominent citizens of Worcester, and some two hours were delightfully spent in the enjoyment of a bountiful and elegant collation, in listening to brief addresses from several gentlemen present, and in personal questions and conversation. Wm. T. Merrifield, Esq., of Worcester, presided, and the speakers were Hon. Henry Chapin and Hon. W. W. Rice of Worcester, Judge Bennett of Taunton, Benj. P. Ware, Esq., of Marblehead, Dr. Wakefield of Monson, T. S. Gold, Esq., Secretary of the Connecticut Board of Agriculture, Dr. Fisher of Fitchburg, Rev. Mr. Lamson of Worcester, Charles B. Pratt, Esq., and the Secretary of the Board. The occasion was an exceedingly pleasant one, and the thanks of the Board are due to the gentlemen whose thoughtful kindness prompted them to conceive and carry out so successful an entertainment.

THIRD DAY.

The Board met at ten o'clock, and Whitney L. Warner, Esq., of Sunderland, was chosen Chairman for the day.

MANURES AND CHEMICAL FERTILIZERS.

BY HON. LEVI STOCKBRIDGE.

Mr. Chairman and Gentlemen of the State Board of Agriculture:—On former occasions like the present, I have had the honor of addressing the Board upon the subject of manures and chemical fertilizers, and the principles of plant-nutrition. The statement has been made, that after long years of experiment and examination, after the discussion of a variety of opinions which had been received and discarded, after the trial of many and exhaustive experiments, scientific men, at the present time, were agreed, or in harmony, in the main, practically, in relation to the principles of plant-nutrition, and that the experiments at the Agricultural College had been simply an attempt to see if these acknowledged principles could be applied in practical agriculture. The statement of principles has been, that scientific men know absolutely what plants are made of; that the composition of perfectly mature, healthy, well-developed plants is unvarying. The composition of plants is not an accident, but a design. The wheat plant of to-day, in its composition, in obedience to natural law, is practically the same thing that it was a thousand years ago, and is in its composition to-day practically what it will be a thousand years hence. Law, and not accident, controls it; and that is true in relation to all the plants of our fields. The statement has been made, that, in relation to the materials of which plants are composed, all, so far as the plants are concerned, are equally important. If a plant takes a fraction of one per cent. into its composition of soda, for example, that one fraction of one per cent. of soda is just as important to the plant as ten or fifteen per cent. of lime or of potash; and so with every other element that enters into its composition. To the plant, all the elements that enter into its composition are absolutely essential, or a perfect plant cannot be formed. It has been stated, that, so far as the farmer is concerned,—the man whose business it is to feed and to produce plants,—there is a wide difference in the importance of the different elements which enter into the composition of plants; as, for instance, while every plant which is formed must have a large per cent. in its composition of carbon, and it cannot be formed without carbon, yet, so far as the farmer is concerned, he may throw this part of the plant's composition entirely out of his account, and he need never feed a plant with carbon. It has an exhaustless supply of this from natural sources. So with the other organic elements of plant-nutrition, with the exception of nitrogen. Nitrogen, which a large proportion of our plants take in large quantity, the plant cannot get its full supply of from natural sources, although it may draw much; and nitrogen the farmer must supply. So with the other elements. While the plant must have soda in its composition, yet, so far as the farmer is concerned, soda can be supplied by the soil itself in sufficient quantity for all the plants that will probably be produced upon it, and the farmer need never supply soda for the food of plants. The standard of the maximum yield of crops on all soils is the minimum supply in the soil of any one of the mineral elements which the plant requires.

So, too, in relation to the condition of the food of plants. Scientists are perfectly agreed, I think, in this matter, that the materials which enter into the composition of plants must always be in a certain condition before the plant can appropriate them. You may give to the soil and to the plant an endless supply, without limit, of raw, coarse, undecomposed, bulky material, and yet, while you do that, you give to the plant but a very small quantity indeed of plant-food that can be available to it.

It can be of no sort of use in feeding the plant until this coarse, raw, crude material has passed through a stage of decomposition, and the elements of plant-nutrition contained therein have been eliminated from the coarse material, and made solvent in water. As a natural consequence, these scientists believe, that if plants are fed with the right materials, in the right proportions, and in the proper condition, a very small quantity of this material applied to the land will produce as large crops, as perfect crops in all respects, as immensely large quantities of coarse, crude, unprepared material. In other words, scientists believe, that, so far as plant-nutrition is concerned, a very small quantity of the chemical materials which are the food of plants, properly prepared, in a proper condition, and in proper proportions, applied to the soil, will produce just as large crops, as large quantities of coarse, crude, improper material, and that the farmer may positively rely upon producing large crops from small quantities of chemical materials, properly compounded, prepared and applied.

These, gentlemen, in as few words as I can state them, not to take your time in going over the whole ground, are supposed to be, in the main, the scientific principles of plant-nutrition. The experiments at the Agricultural College, as has been already stated, have been simply an attempt to find if those scientific principles could be applied in practical agriculture; to see if chemical substances could be combined, and if, with those substances, we could produce the ordinary crops of the farm. And for this purpose, to ascertain this fact, from time to time, little by little, step by step, rules have been laid down; rules have, at the college, been gradually, little by little, developed, until we have come to see that certain elements, compounded in certain proportions, will produce, if applied to the land, certain results, or approximately certain results; and these rules have come to be called "formulas," and, in common parlance, through a large portion of the Commonwealth, and in the papers of the country, "the Stockbridge formulas." Now, I understand that during the past year, certain scientific men, or certain men who would appear very scientific, in certain quarters, have said that those formulas, drawn down to scientific rule, were incorrect. It has been said, and it has been published, that those formulas or rules must be a humbug, because they have been changed; that the formula of 1875 was not like the formula of 1874, and the formula of 1874 was not like the formula of 1870. These statements have been publicly made, and I feel justified now in saying a word about the formulas or rules which have been laid down for compounding chemicals to produce various crops. Had a brother farmer come to me in 1869, and asked me, "What are you doing in the way of experiment?" I should have told him honestly exactly what I was doing. If he had asked me, "What are you using?" I should have told him honestly and plainly what I was using, and how I mixed it. If the same farmer, or another one, had come to me in 1870, and said, "What are you doing? What are you using? How do you compound the materials?" I should have told him, and I should have told the farmer in 1869 one story, and the farmer in 1870 another. In 1871, I should have told him another story; in 1872, I should have told him another story; in 1873, I should have told him another; but in 1875 and 1876, I should have told them all the same story,—the fact being, that farmers and the public broke in on me in my line of march and investigation. That is the fact. While other men were talking about investigating, or basing their investigations on the investigations at the college, it should be remembered that the investigations at the college were moving right straight along, bound by no rule, bound by no theory, but getting at the determined facts of each year's experiments. We were inquiring in a new field, as it were, and what we ascertained to be a fact this year, we endeavored to apply in the compounding of fertilizers the next year; and that is the reason, gentlemen, why the formulas have been changed. It was supposed that they were to be changed; I believe they are to be changed again; I may be mistaken. The experiments are not yet completed. Before I am done to-day, I shall indicate the direction in which it is possible these formulas may yet be changed, because there is yet a broad field to be investigated in this matter. Thus much pardon me for saying in regard to the "Stockbridge formulas," and the correctness of those formulas.

Now, I have stated that the experiments of the Agricultural College were simply an attempt to ascertain, if possible, if the acknowledged principles of plant-nutrition could be applied in practical agriculture. Since the last meeting of the Board, we have had another year's experience; we have had another year for study, trial, and experiment, and I stand here to say that this year's experience, trial, and experiment has only served to confirm me in my previously expressed belief in relation to this whole matter, and to enable me to express in stronger language, and with more confidence, my belief in the theory that has been advanced heretofore, than I could use one year ago, and your attention will now be called to some of the experiments at the Agricultural College this year, from some of which nothing whatever has been learned; from others, certain things have been learned.

But before proceeding to give, in as few words as I am able, the result of those experiments, I wish to say a word about the season of 1876, and I preface it by this strong statement. I do not believe that the farmers of New England have, in the crops of this year, received their money back for the fertilizers that they have used, whether barn-yard manure, the Stockbridge fertilizers, or any other fertilizer that could be bought in the market. It has been a season of unparalleled and unprecedented drought and heat, except in certain localities, where there have been local showers to give relief. Crops manured with all kinds of fertilizers have been injured, and even deep-rooted trees have suffered from the dry weather, until their leaves have been seared, their fruits have shrivelled and dropped from the bough. This is the fact in relation to

New England. The same excessive drought has extended to a greater or less extent in the Middle States. Maryland, Virginia, and parts of North Carolina have been blessed with abundant rains. South of that, Georgia, South Carolina, Alabama, Florida, have suffered from drought. Now, remembering this fact, with a few remarks that this suggests to my mind, I will come to the results of my experiments.

It occurs to my mind, because it has been mentioned to me since I came to Worcester, to say something about the effect of the weather on the use of chemicals as fertilizers. I have been told here in Worcester that the professor of agriculture made a statement at Haverhill, and made it in different quarters a year ago, that if farmers would use chemicals, they would be entirely independent of the weather. I do not believe that the professor of agriculture ever made that statement, or ever made one that any man could honestly construe into that, because, in the first place, the professor of agriculture, although not wise, is not so much of a fool. Any man's common-sense, as well as his intelligence, teaches him that the weather has much to do with the perfection of crops, especially the rainfall and the heat. Now, the professor of agriculture has stated, and he boldly repeats it here to-day, and proposes to stand by it, that when he uses chemicals as manures, the farmer is more independent of the changes and vicissitudes of the weather than when he uses raw, coarse, undecomposed, unfermented manures; and that in a season when there is only an ordinary variation from the average seasons, but a variation which would affect crops on coarse, raw, unprepared manures, the crops on chemicals, which are absolutely plant-food, which are ready to feed the plant, and therefore require no decomposition and little water, will not be affected by such seasons. But where we have a scorching, burning drought, or where we have a midsummer frost, no man ever did, and no man ever will, find fertilizers that will screen him from damage and loss from such seasons and such weather. That is what the professor of agriculture believes, in relation to chemicals as plant-food.

Now, I have made the statement, that the season of 1876, in its effect upon crops, has been a remarkable one. I want to be sure that I do not make any mistake in this matter, and therefore I will give you the result of the investigations at Amherst in relation to the season, and, of course, its effect upon crops. I desire to compare the rainfall and the temperature. This tells the whole story in relation to the influence of the seasons on our crops. The farmers in adjoining towns say that we have been blessed with abundance of rain this year as compared with them. We have thought they were blessed with rain as compared with us. It is probable that the average has been the same in all the towns. I think the farmers in the valley of the Connecticut will bear me out in saying that until this year, the year 1873 was one of the severest seasons for crops that we ever knew. The rainfall in Amherst, in 1873, during the months of May, June, July, August, and September, was a little more than $16\frac{1}{2}$ inches. The rainfall of those same months in 1876 has been $16\frac{1}{2}$, and a trifle more. It did not vary but $\frac{2}{1000}$ of an inch in the two years. The temperatures of 1873 and 1876 are altogether unlike. The average height of the mercury has been four degrees higher in 1876 than it was in 1873. Therefore, we have had this year unparalleled droughts, combined with excessive heat, making it disastrous to our crops beyond the year 1873; and the remarkable part of it has been, that in the month of August this year, which was the month that did the work of mischief, that killed the corn crop and destroyed our fruit crop,—in the month of August, this year, in Amherst, we had only 2.072 inches of rainfall. It is a wonder that the entire vegetation of the earth was not destroyed. Now, I will compare 1876 with 1874, because that was the year in which my experiments began on a broad scale, in the open field, and see how the two seasons compare. In 1874, the rainfall of May, June, July, August and September was 26.369 inches; in 1876, during the same months, it has been $16\frac{1}{2}$ inches. During those months, we had almost ten inches more rainfall in Amherst, in 1874, than in 1876. During those two years, in relation to temperature, which enforces the condition of rainfall, we have had an average temperature in 1876 of seventy degrees, and in 1874 our average temperature was less than sixty-five degrees. In other words, in 1874, when these open-field experiments began, we had twenty-six inches of rainfall and a temperature of sixty-five degrees. In 1876, we have had sixteen inches of rainfall and a temperature of seventy degrees. Now, gentlemen, it is fair to say, that, notwithstanding all that may be said about chemical fertilizers making crops independent of the season, such wide variations in the season as these must effect crops upon any fertilizers or upon any manures.

I come now to speak of the experiments, and I shall be as short as I possibly can and give you any idea of what the experiments this year have been.

The old series of experiments has been kept along, but a new series has been commenced, and before I close I shall, in connection with another matter, allude to this new series of experiments.

Scientists agree, that plants can supply themselves with a proportion of their needed nitrogen from natural sources. In the air there is nitrogen in the form of nitric acid, in the form of ammonia, and then that exhaustless supply of nitrogen, the elemental nitrogen of the air. Without stopping to inquire how it is that plants get their nitrogen from any source, we agree that they do get a portion of nitrogen from these sources. The all-important question to the farmer is, How much? Nitrogen being the most costly element of plant-nutrition, if it were possible to know how much the different plants and different crops obtained, and to reduce it to rule, many hundreds of thousands of dollars would be saved to the farmer. Therefore, to learn this thing, if it be possible to learn it, a series of experiments was begun this year in this direction. The crops taken were oats and corn to represent the grains, potatoes and mangolds to represent the root-crops, and beans to represent the leguminous crops. To each one of these crops we gave four plots of land. In each case, one plot was planted without the fertilizers, to determine the general effect of the fertilizers; and the other three plots, while they had the same chemicals precisely, and in the proper proportions, were fed with different proportions of nitrogen. The crop was carefully tended in each case, notes made of the influences acting upon the crop, the condition of the crop as affected apparently by the weather, the crops carefully harvested, and the record made; and we have learned nothing,—*nothing whatever*. There were sixteen plots, upon which a great deal of work and a great deal of thought and care were expended, and we have learned nothing. The variations between the different plots with the different proportions of nitrogen have been so small, that, in view of the fact that the effect of the drought was different on the different plots, and in view of the fact that the different plots might have been of such different degrees of natural fertility as would account for all the ascertained difference in the crops, I should not be justified in saying that I have learned anything. I only say in relation to this series of experiments, that they have been carefully tried, the record has been carefully and correctly made, and it may require ten years of just such labor and just such experiments to learn that we are on a wild-goose chase, and never shall find out anything, or learn anything valuable that we can apply practically.

The plots with which we have experimented in previous years have been experimented with this year. It is a matter of no great interest, but I will give the result of those experiments, and draw my conclusions.

A plot of land which has been previously described—drift-soil, full of round, water-worn stone—was planted in 1874, and manured with chemical fertilizers, to produce fifty bushels of corn to the acre above the natural yield. This, I say, was in 1874, the year spoken of, when we had twenty-six inches of rain and an average temperature of sixty-five degrees. Judging by a plot planted without manure, we called the normal fertility of the land capable of producing thirty-four bushels of corn to the acre. That was its product that year. The plot to which the manure was applied produced that year eighty-three bushels. In 1875, the same application was made, and the manured plot produced seventy-four bushels; the unmanured plot, twenty-five bushels. In 1876, the same plot of land, manured in the same way, produced forty-eight bushels; the unmanured plot, nothing,—or, I have it here, two bushels of corn. I may as well say nothing. I lay that to the dry weather. I think the unmanured plot would have produced, from its natural fertility, a little corn this year, but of course everything was burned up by the dry weather. The potato plot, in 1874, manured with material for one hundred bushels of potatoes more than the natural yield, gave two hundred and nineteen bushels; the unmanured, one hundred and twenty-six bushels. In 1875, the same plot, manured, produced two hundred and eighty-nine bushels of potatoes: the unmanured, one hundred and twenty-eight. In 1876, the same plot, manured, produced eighty-four bushels; the unmanured plot, forty bushels. The unmanured plot had not one table potato upon it. I will say here, in passing, what some other experimenter will deny, perhaps, that in trying these two plots of potatoes, we discovered a remedy for the Colorado potato-beetle. We did not want to try it. The potatoes on the unmanured plot were extremely feeble; they hardly developed any leaves at all. The weather was dry; this was the third crop without manure. The plot beside it, that had manure, developed a fine top, and the beetles attacked it, and ate it all up, and not a bug touched the unmanured plot. I suppose the fact to be, that the potato-bug found no tender foliage on the vines of the unmanured plot, and therefore they attacked the manured plot, and although they were fought vigorously and persistently, they destroyed the foliage in spite of all that we could do.

The next plot has a lesson in it. It was manured in 1874 with a large quantity of chemicals, to see how much corn could be produced on the acre. It yielded one hundred and four bushels of shelled corn. The normal yield that year, as you remember, was thirty-four bushels. The same plot in 1875, planted a second time to corn, and unmanured, yielded sixty-four bushels. The same plot was planted in 1876, without any manure, and yet, in this dry season, it has yielded thirty-six bushels. The first year, one hundred and four bushels; then sixty-four bushels; then thirty-six bushels this season, with one manuring, and that in 1874. That is the result of the experiment with that crop.

Mr. Slade. How much fertilizer was put on that first year?

Prof. Stockbridge. The first year, the amount of fertilizer put on was to make one hundred bushels to the acre, the thing being done simply to answer this question, without any regard to results, or anything else: "If you can make twenty-five or fifty bushels to the acre, beyond the natural yield, why don't you make five hundred bushels to the acre and not till so much land?"

Mr. SLADE. I wish to get at the value of the fertilizer.

Prof. STOCKBRIDGE. I cannot tell you anything about it. These fertilizers were all bought in the market by myself, in the elements; but my impression was that the fertilizer put on the first year, at the then price of the chemicals, saying nothing of my labor in preparing (because they were all mixed by myself), cost about $40 for the whole amount put on that acre.

QUESTION. Whether this was applied broadcast or in the hill?

Prof. STOCKBRIDGE. Broadcast—that large quantity.

QUESTION. How much land in a plot?

Prof. STOCKBRIDGE. Each plot taken contained one-eighth of an acre. The next experiment to which I call your attention is a continuation of the one reported last year on an acre and a half of land. The land was taken up outside of the college farm, because it was so poor that nobody tilled it, and nobody cared for it. It had on it moss and hardhack, and was absolutely worthless for tillage. I squatted upon it, and ploughed it, put the chemical fertilizers upon it, and produced, as you remember, sixty-two bushels of corn in 1874. I continued the cultivation upon it in 1875, and the same quantity of the same materials was applied, and it produced seventy-eight bushels of corn. Grass-seed was sown in the corn. It never had grown grass to my knowledge before; at any rate, not since I was acquainted with it. Last fall, a year ago now, it looked splendidly, after taking off the corn. The ground was bare nearly all winter,—a severe winter for new seeded land, as every farmer knows,—and in the spring, it looked brown, as if the seed was all killed; but when rain came in April, it began to look green, and it yielded this year two thousand five hundred pounds of good herdsgrass and clover to the acre. The drought turned it brown in the month of August, so that there was no rowen produced. At the present time, it is looking green, and like a fine mowing field. That was the result of the experiment with grass and corn, for the three years. This is all I have to say about the specific Agricultural College experiments.

Now, I desire to draw a fair and just conclusion from these experiments last reported, and it is this: I honestly believe they sustain the previously expressed opinion that lands could be manured with chemicals, and improved year by year. The question that the farmer asks is, "Will not the effect of the chemicals be exhausted in the first year of application?" These experiments show that the effect of the chemicals lasted at least three years. They increased the crop three years. Remember, gentlemen, that is not the way you farm lands. You do not grow corn year after year on the same land. But that is the way we tried it, and the result proves conclusively that the effect of the chemicals, in the ordinary way of farming, reaches over to successive years, and that we should be justified in taking up poor lands, planting corn with chemicals, and seeding down, as we ordinarily do, and that we shall find the effect of the manure in the after grass crops. I say, I think the result of these experiments last detailed shows conclusively that we may use chemicals as we do barn-yard manure, and that we shall not be disappointed in the results.

Now, do not understand me as saying that the effect of chemicals in subsequent years will be as good as that of barn-yard manure. I am not going to say anything about that. I say, absolutely, that with chemicals used on lands, cropped in the ordinary way, we found a very satisfactory result in the grass crop the third year succeeding. I think the result of the experiment justifies me in drawing that conclusion.

QUESTION. If our barn-yard manure was as finely pulverized as the chemicals, would it be likely to last any longer than the chemicals?

Prof. STOCKBRIDGE. If you will bring barn-yard manure into the absolute condition of plant-food, then they are alike. The trouble is, that barn-yard manure will not, in one, two or three years, get into that condition, in the ordinary way of treating it.

Now, gentlemen, after all that has been said about these little experiments at the Agricultural College, the great experiments of this year have not been tried on the Agricultural College farm. The great experiments with chemical fertilizers, this year, have been tried all over this wide land, on more than a thousand farms, under all possible circumstances of diversity of soil and climate, drought and rain. A year ago, come winter, it having become perfectly apparent, that although the formulas from which these materials were prepared were in the hands of all the farmers of the Commonwealth, and they could buy the materials and mix their own fertilizers and try them to their heart's content, yet various parties were about to engage in the business of manufacturing and selling these fertilizers, the right to manufacture and sell them was secured, as a guard against fraud, deception and cupidity, and the right to manufacture was put into the hands of a firm in Boston. It was put into their hands, first, because they were supposed to be very intelligent; second, because they were supposed to be perfectly honest; and third, because they were supposed, from long acquaintance, to have a deep interest in agriculture and agricultural prosperity, outside of any fertilizer or any commercial operation whatever. Those gentlemen have informed me that they have sold the fertilizers, this year, and that parties have bought the uncompounded chemicals from various sources, to such an extent, that I am justified in saying that more than four thousand acres, this year, have been under experiment with chemical fertilizers; and that this use of chemical fertilizers has not been localized here in Massachusetts, but they have been used all over the country, from Maine to Louisiana, in almost if not every State of the seaboard States of the Union. It is to these broad, open-field experiments, in the hands of all kinds of men, intelligent and ignorant,—men who understood what they were doing, and men who did not understand what they were doing,—that I now call your attention in relation to the results of the use of chemical fertilizers on the farm.

There have been failures, undoubtedly; there have been wonderful successes; but, on the whole, taking into account the failures of all kinds and descriptions, and the successes of all kinds and descriptions, I shall feel justified when I have called your attention fully to these experiments, in drawing some conclusions. But I desire to put the experiments themselves before you, that you may, independently of me, draw your own conclusions.

The first experiment to which I call your attention, is an experiment tried by the superintendent of the Agricultural

College farm, and he is here, and will correct me if I do not report the experiment aright; for the farm superintendent undertook to play a very nice game or ruse on the professor of agriculture. About twenty acres of corn were grown on the farm this year. The corn-field selected was good, warm, sandy loam soil, in good condition. One field of ten acres was manured with about twenty loads of good barn-yard manure to the acre, ploughed in. Half of the field was then top-dressed with a compost of night-soil, harrowed in with a Randall harrow. The other half of this ten-acre field, after having been ploughed and properly tilled, was manured in the hill with Bradley's XL superphosphate. The other corn-field and the farm had about twenty loads of good barn-cellar manure to the acre, ploughed in, and Bradley's XL superphosphate put in the hill.

QUESTION. How large were the loads?

Prof. STOCKBRIDGE. The loads were drawn by a pair of 2,600 horses,—all they could put on, which means a pretty good load.

QUESTION. How many cubic feet, do you suppose?

Prof. STOCKBRIDGE. Probably a little less than half a cord. That is about the amount of manure put on to each field. Those fields were ploughed and planted in season. Everything was done in order to those corn-fields. Then, in order to test the professor of agriculture, the farm superintendent went into the market and bought the Stockbridge fertilizer for corn. Not such as I make. He did not come to the corn-house, where I mix it; he did not want to let me know anything about it; but he went and bought it already prepared, so that he should have such materials as others had. He applied this to land that no farmer would say was fit to plant corn in. It was not corn-land, but cold land, mucky land. He ploughed it on the seventh day of June, after the other corn was up and hoed. On this land he put the fertilizer for seventy-five bushels of corn, and harrowed it in with a Randall harrow, having ploughed the land about six inches deep. There was just four-fifths of an acre of land, by measure, exactly. He then gave the lot up to nature, and said, "Go it!" He only hoed it once with a hoe; cultivated it twice, and, last week, I think, he cut and harvested the corn there was upon it. On one side of the field; within ten feet of the line of the ploughed land, was a large, beautiful, magnificent elm, which gave picturesqueness to the scenery, but did not improve the corn-crop a bit. On this one-fifth of an acre, the corn on about four or five rods on one side of the field, that was completely under the influence of this tree, died, so that the ears all hung down. He harvested it and weighed it accurately, and, on my solicitation, reported what the result was. He got, on that four-fifths of an acre, sixty-nine bushels of shelled corn. He reports that he had more corn on this four-fifths of an acre than on the best acre of that manured with the barn-yard manure; not the average, but more than on the best acre that suffered least from the drought; the average of his other fields being less than sixty bushels to the acre.

Question. How much did his fertilizer cost him?

Prof. Stockbridge. He reports that, taking into account the cost of fertilizers, tillage, and everything, that corn cost him forty-four cents a bushel.

Mr. Slade. Was not this piece better adapted to stand the drought than his large fields that had manure?

Prof. Stockbridge. The large fields stood the drought better than this small piece. This muck land dried up and suffered severely. It was like powder in the dry weather. As my friend knows, muck land suffers more from drought than sandy land.

The next experiment to which I call your attention is one where I know nothing whatever of the party or the section of country. I cut it from the "Vermont Farmer." I do not doubt that the gentleman referred to is an intelligent man; I do not say that his experiment was not fairly tried. Everything, so far as the man is concerned, is all right, I have no doubt.

"Stockbridge Fertilizers for Corn.—Col. John B. Mead of Randolph, who applied 'Stockbridge fertilizers' to one acre of his corn-field in place of barn-yard manure, reports that the crop so fertilized was a failure. While that portion of the field having barn-yard manure gave a good yield, the corn on the 'Stockbridge' acre was very poor in quality and small in quantity. It was so evident that the thing was a failure, that he did not consider it worth while to measure the crop before condemning the chemicals as worthless for raising corn."

You have that just as I have it, and I desire to accept it just as it is. I don't know anything about it.

The next experiment to which I call your attention (and I do this with a great deal of seriousness; I mean all I say in relation to it), is the experiment of the Sturtevant brothers, in Framingham; gentlemen who are well known to you, and who, through the columns of the "Scientific Farmer," are month after month keeping you familiar with the experiments that are being conducted on their farm in Framingham, which are worthy of the attention and study of the farmers of the State. They are experimenting in different directions, and some of those experiments are of very great value. I should say here, that Dr. Sturtevant is a little inclined to be after the professor of agriculture about these matters, and he came to Amherst a year ago last spring, stating that he had no faith in this thing; he wanted to try it; he did not believe anything until it was tried and proved. He did not want to take anything in print; he wanted it from a man's own fist, and wanted his autograph under it. He wanted I should write down what he should get to grow a crop of corn, and tell him how much corn he should have, and then he would put it to the test, and blow me up or blow me down (good-naturedly, of course), according to the result. So I put the directions in black and white. I told him what to get, how to mix it, how to apply it, and how much corn he should have. Of course, I did not know anything about it; but that was all well enough. He went away and tried the experiment last year. He tried it faithfully, and before telling the experiment this year, it is necessary I should tell the result of that experiment, because the experiment this year has been on the same land. In 1875, he put on material for fifty bushels more than the natural yield, and he got eighty-two bushels to the acre of shelled corn. I think the committee of the society who awarded him the premium, reported that the yield was more than one hundred bushels to the acre, by measuring single rods; but he reports the yield of the eight acres to be eighty-two bushels to the acre. I have not dared to question him, lest I should be found at fault, but I believe the report was, that on one field the crop was within two bushels of the predicted yield, and on the other within six bushels of the predicted yield. I do not know whether it was two bushels more or two bushels less, or six bushels more or six bushels less.

Dr. STURTEVANT. We applied the materials for sixty bushels of shelled corn to the acre, and the yield came so near that amount that it scared me! The variation from your prediction was six-tenths of a bushel.

Prof. STOCKBRIDGE. I thought I was not overstating it. Now for the experiment of this year. They have grown sixteen acres of corn with chemicals, eight of which was the same land treated with chemicals in 1875. They report a yield of seventy-five bushels of corn per acre, grown at a cost of forty-five cents per bushel. On eight acres of this land, where they obtained the largest yield, the cost was twenty-two cents per bushel.

The next statement which I wish to make, is this: A gentleman in a town adjoining Amherst (I do not want to call his name, for I do not think he would be willing to have me) sent to Boston and bought the materials for fifty bushels of corn to the acre for ten acres. Having purchased it, he came to me to know if I thought he had done a foolish or a good thing, telling me on what kind of land he was going to apply it, and asking me how he should apply it. I told him how to apply it, and at the same time told him that if the manufacturers did their duty they would put upon the material (which had not then arrived) full and distinct directions how to use it, and to follow those directions or mine. I saw no more of the man until July, when I met him one day and asked him if he got the material, and how his experiment was proceeding. "It is a total failure," said he; "it didn't amount to anything." "What is the matter? Dry weather?" "I don't know. It didn't amount to anything." "Well, what is the matter?" "Well," said he, "perhaps I am a little to blame about it. I got the material, got the land all ready, got it all furrowed out, and, instead of spreading it on broadcast, I thought I would strew it in the furrow. I was called away; my men went on and planted the corn, and I did not go near the corn-field until I went to see if the corn needed hoeing, and there were not ten spears of corn on the field. I found that the men, instead of strewing the material in the furrow, had dropped it in the hill, and planted the corn upon it. I had it planted over again, and the corn had just started when the drought came on, and it does not look as if I should have much corn." I saw him again this fall, and he told me he had considerable corn, but the crop was so much less than he expected that he would not measure it. He pronounced it a failure, and so do I.

The next experiment to which I call your attention, was tried on a piece of land upon Montague Plain, which, on an average, produces twelve bushels of corn to the acre, and about five bushels of rye; my idea being to make fifty or sixty bushels of corn to the acre on that land. The man reports that he applied it as directed, and that the first of July no mortal man ever saw such a stand of corn on Montague Plain as there was there; but it had then begun to suffer by drought, and although, the last of July, the tassel was developed, yet it dried up and died so quick that it never developed any pollen at all, and there was not an ear of corn on the field. Now, you men who reason about fertilizers, about the modes of applying them, etc., can learn a lesson in a certain direction by the result of that experiment. An enormous mass of foliage was developed, the ears were set, the tassel developed, and then it died so quick that no pollen was developed, and there was no corn; while a piece of corn on exactly the same land, within thirty rods of it, manured with ashes, did not thus dry up, and yielded twelve bushels of corn to the acre. Let the experiment stand as the record is made.

The next experiment is one tried by Mr. John Turner of Baltimore County, Md. He says that he purchased two formulas for corn, two for oats, and two for Hungarian grass. The fertilizers, he says, came too late, but he applied them according to the directions, and, as a result, he had the best two acres of corn, the best two acres of oats, and the best two acres of Hungarian grass that ever grew in the State of Maryland. I am willing that should be taken down considerable, because they have had good crops of corn and grass and oats in Maryland before. But he was undoubtedly surprised at the result of the experiment. The corn yielded eighty bushels to the acre; the oats, sixty, and the Hungarian grass, three tons,—there being six acres of the land.

Mr. William Birnie of Springfield tells me that he bought $300 worth of this material, and the results were highly satisfactory. He used $28 worth of it on an acre that would not have produced fifty bushels of ears, and it produced one hundred and seventy-five bushels of ears of sound corn. He applied it to eight acres on a farm in West Springfield, and had one of the finest fields of corn in that town. He applied the chemicals to three acres for potatoes, but owing to bugs and dry weather, they were a failure.

N. Austin Smith of Sunderland reports that he purchased and used the chemicals this year for the third year; that all the crops on the Stockbridge fertilizer promised well early in the season, but suffered terribly by the drought. He does not think any man in the town, who bought that or any other manure, has got his money back in the price of crops.

Chester Smith of Hadley says he purchased the fertilizer for ten acres of land, two miles from the barn, to avoid drawing manure that distance, and put the material on a piece of clay loam land. He had a splendid crop of corn, although it suffered severely by drought. He says he does not know why, but it was altogether better than a piece of the same size which he heavily manured with barn-yard manure.

R. J. Hadaway of Thomasville, Thomas County, Ga., says, under date of November 6:—

"I have this year used the Stockbridge formula for corn, and I am able to report a favorable result. The crop was planted the 8th of June, and had a long and severe drought to contend with; but it gave me forty-eight bushels of corn per acre. I am perfectly satisfied that if it could have been planted in February or March, which is our usual time of planting, it would have brought me seventy-five bushels to the acre. I am so well satisfied with it, that I shall have more next year."

S. G. Hurd, Esq., of North Hadley, writes:—

"I have used the chemical fertilizers this year on grass, corn and tobacco, and in each case with as good results as the season would allow. On three acres of light, sandy soil, I have harvested three hundred and twelve bushels of ears of sound corn; but I think the smut and drought lessened this crop fifteen bushels per acre. On one acre of moister land, which did not suffer so much by drought, I have harvested one hundred and fifty-eight bushels of ears, though that yield was lessened one-fifth by smut. On my corn land, I applied eighteen dollars' worth of fertilizers per acre. On grass, I sowed ten dollars' worth per acre in the spring, and obtained my money's worth the first crop. The drought nearly destroyed the second crop. I used it on three acres of tobacco, mixing it with loam and applying it in the hill. I have the best crop I ever raised, and I think the fertilizer had something to do with it. I think this is the best fertilizer that can be used in a dry season, for it is actual plant-food, and no mistake." [That is nothing but his opinion.] "I have not been able to note a single failure among my neighbors where this fertilizer has been used upon their crops, and I think I have observed very closely."

The next experiment is one which is taken from the "Providence Journal." I know nothing about the man. I do not know what his initials mean, or anything about it; but it is an experiment that has found its way into the papers, and so I accept it. It is as follows:—

"GREENVILLE, R. I., August 21, 1876.

"*To the Editor of the Journal:*—In April last, I purchased of Messrs. Rice & Co. of your city Stockbridge fertilizers for several crops, and for the benefit of farmers generally, I wish to state my experience with them. I used them on about an acre and a half of ground, where there had been no stable manure of any kind put on for six years, where the soil had been completely exhausted, and under these unfavorable circumstances, I raised as good a crop as any of my neighbors who used plenty of barn-yard manure and ashes; and for some unexplained reason, mine stood the severe drought equally as well, if not better, than theirs, and it has certainly exceeded my expectations in every way. While with many barn-yard manure may be considered 'king,' in view of its high cost and trouble of application, I shall continue to use the Stockbridge fertilizers, for I have great faith in them for special crops. I believe the Stockbridge theory is the correct one. J. A. B."

The next is from Raymond, Me., under date of November 7:—

"According to request, I send statement of my crop with these fertilizers. I planted one acre of corn with these fertilizers—sandy interval land—which had not been ploughed for sixteen years. I bought the land last spring. It had been mowed every year for the sixteen years. I mowed it myself two years ago for the man who then owned it, and it did not cut five hundred pounds of hay to the acre. On one side of the field there was a row of trees along the bank of the river, and, on account of the shade and main roots, I lost most of the corn of twelve rows on that side. In just ninety days I cut it up and stooked it. We husked one hundred and eight baskets, which we called fifty-eight bushels of shelled corn. I have shelled some of it, and it holds out four quarts more than a bushel to the two bushels of ears, besides shrinkage. If it is possible for me to do it, if I can get the money next spring, I intend to invest more largely in this material. GEO. W. OSGOOD."

Mr. H. C. Comins of North Hadley, says:—

"I used the chemicals this year, according to the Stockbridge formulas, for corn, onions, and cabbages." [I think he did not buy them already compounded, but he bought the chemicals and compounded them himself.] "To one acre of good level land, which had been under cultivation six years, I applied the materials for sixty bushels of corn. The crop was seriously injured by drought and smut, but I harvested ninety-eight bushels of dry, sound corn, allowing eighty pounds of ears for the bushel. On eight acres, I applied the materials for fifty bushels of corn to the acre. One acre of the eight was covered by an apple-orchard, which shaded the land and destroyed the crop, and the whole field suffered by drought."

He thinks the crop was diminished one-fifth by smut, but he harvested fifty-four bushels of shelled corn to the acre, on the same basis, eighty pounds of ears to the bushel. He applied seventeen dollars' worth of this material to one hundred rods for onions. The crop suffered both by the drought and maggot. He harvested one hundred and twenty bushels of onions, but considers the experiment a failure. He used one formula for cabbage on an acre and a quarter of land, and the results were highly satisfactory. The heads were large, sound and heavy, and he proposes to try the experiment again.

Gentlemen, excuse me for reading this mass of stuff to you. I felt it necessary to do it, that I might have a reason for saying what I now desire to say. I never anticipated that this material, compounded by anybody, or compounded by each farmer on his own farm, could be applied to the land, and accomplish what some men have said that I predicted it would accomplish; that it could be used in this promiscuous way, as we use other manures and other fertilizers, and every man could take his material for fifty bushels of corn and apply it to his land, and invariably, without regard to the vicissitudes of the season or the character of the land, get his fifty or seventy-five bushels of corn to the acre. I never made the statement that any man could do any such thing. I have said that with the chemical fertilizers, compounded in a certain way, applied in certain quantities, such a crop, or approximately such a crop, could be depended upon. I never anticipated, when I said, "Put on the material for fifty bushels to the acre beyond the natural yield, and you will get fifty bushels to the acre more than the natural yield," that anybody would come within an eighth of a bushel, as Dr. Sturtevant did in his experiment. I believe that was the extent. I did not want anybody to think that was strictly according to scientific principles. The idea is this: that here are commercial fertilizers,—I do not mean the Stockbridge fertilizers; I do not care anything about the Stockbridge fertilizers, any more than I do about Bradley's fertilizers; that is a matter of no account,—here are chemicals, that, when barn-yard manure is exhausted, when all the ordinary means of fertilizing your farms are used up, can be compounded on certain principles, which any man can comprehend, and you can grow crops and improve your land; that you can take poor land and gradually bring it up, when your barn-yard manure is gone; that in an extraordinarily wet or dry season, it is a safer material than the crude, coarse, raw materials which we call barn-yard manure; and that, on the whole, during a period of ten years, you can rely on getting just about so much corn, so much grass, so many bushels of potatoes, on the average, according to the quantity of material you apply. You may give these fertilizers or chemicals any name you please; I do not care what you call them; but this is the fact, that nitrogen, potash, phosphoric acid, lime, and magnesia, for certain crops, compounded on certain principles, in a soluble form, will manure your land, make it rich and fertile, and you need not keep cattle on your farms for the express purpose of making barn-yard manure. But do not understand me as saying that I advise you first to throw your barn-yard manure away. Some men have said, that, because I recommend the use of chemicals, I do not think it is best to save barn-yard manure. My opinion on that matter is on record, and I do not feel inclined to change it. Use barn-yard manure, because it is a waste product; use the waste of your slaughter-houses and manufactories,—use them all, and then take the chemicals. Notwithstanding the failures reported, notwithstanding the failures that are to be reported,—for I doubt not there are gentlemen in this hall who have tried these fertilizers this year and failed, and there are gentlemen here who have tried them this year and succeeded,—notwithstanding the failures, I say, I believe that you can use these materials, and use them with success.

Now, then, I will venture to make another prediction,—and if any man desires to carp at chemicals, I wish him to put it down and either test it himself or allow me to test it,—I venture the prediction, that I can take chemicals thus prepared, and I can take these old, worn-out, exhausted, brush-producing pastures of Massachusetts, and by proper management, I can bring those pastures back to their pristine fertility, and make them produce the grass necessary to produce the fine stock and fine milk of former years. We can never do it with anything else. We cannot cart barn-yard manure on to those pastures. A large proportion of our hill lands are to be depopulated unless something is done; but if you can with chemicals bring the pasture land of New England back to its former state of fertility, you may keep your boys on the farm, keep the farms on those hills, and keep the birches off of them. There is nothing else that will do it. But I venture the prediction, that with these chemicals,—I do not say the Stockbridge fertilizers; I do not care anything about that,—I say that with these chemicals, properly prepared, those fields can be made to produce grass as they did in the days of our fathers.

Having said this much, I feel authorized in saying something more. What I am about to say is to the farmers I see before me, and I desire to talk it straight to your understanding, as I talk it straight into your ears. It is no part of my business, gentlemen, as professor of agriculture at the Agricultural College, to try experiments; it is no part of the business of the professor of chemistry at the Agricultural College to try experiments; and yet the farmers of the Commonwealth feel that that is to us the "chief end of man"; that the professor of agriculture and the professor of chemistry are there to experiment for the farmers of the Commonwealth. I do not object to your idea, farmers, that the Agricultural College is there for the benefit of the farmers of the Commonwealth; but when you claim my services to work for you directly in the way of experimenting; when you claim the services of the professor of chemistry to work for you directly, I say we are private individuals. I have my specific assigned duty at the college, and so has the professor of chemistry, just exactly like the professor of modern languages and the professor of English literature. Each one has his assigned duty, every hour is occupied, and we are under the orders of the governing powers of the college. They do not assign me any time to experiment; they do not assign Dr. Goessmann any time to experiment. They do not pay any of the expenses of my experiments; they do not pay any of the expenses of his experiments; and yet I find Dr. Goessmann at work early and late out in the vineyard, feeding grape-plants with this and that; I find him working early and late in the laboratory, going through the most tedious and most exhaustive analyses to learn certain things about feeding grapes with certain elements; analyzing the seed, the skin, the pulp, the juice, and analyzing the vine. But that is no part of his business as a college professor. He has all his hours employed with his classes, and this is entirely outside work, simply because the man has the love of the thing in him and cannot let it alone. Wait, gentlemen, until he has had a few more years to work, and you will have something from these experiments with the grape that will be worth your while to know. But that is the work of Dr. Goessmann as an individual, not the work of Dr. Goessmann as professor of chemistry at the Agricultural College. So with the professor of agriculture. All his hours are employed in his specific routine work. He is tied to the school-bell. All his experiments with fertilizers, and everything else, are because he cannot let them alone. That is the reason why.

Now, I make these remarks for this reason. Experiments tried in this way, breaking in upon the regular duties of the college professors, must necessarily proceed very slow. The farmers of this Commonwealth, I find, are all aroused to the importance of these questions. We cannot work fast enough to supply the demand. The farmers of this Commonwealth could not wait for the results of these experiments with fertilizers. They jumped into my car, before I got half ready for the load, and it will be so perpetually. It cannot be otherwise. We cannot work fast enough, and we must have long, long years to go through and complete these experiments, before they will be ready for the public, as we are situated. Now, what follows? The Commonwealth of Massachusetts to-day demands an experimental station at the expense of the Commonwealth. That is what we demand. I have begun this year an experiment at the college that, work as hard as I will, I cannot complete for the next ten years, working as I do. Connecticut has her experimental station. I am glad for Connecticut, but I am ashamed for Massachusetts, for we ought to have been first in the field. And when I say Massachusetts, I mean the men in State Street; I mean the men, women and children in your factories and your manufacturing establishments all over the State, as well as the farmers who are tilling the soil and growing the crops. Every man, woman, and child in this Commonwealth is interested in the results of experiments of this kind. Therefore, the Legislature of Massachusetts should be called upon to establish an experimental station, and thoroughly equip it to experiment, not only with fertilizers, but with all our crops, with stock, with dairy questions, and everything of this sort, and work them out, and, as a result, every man, woman and child in the State will be benefited.

Now, then, we have got through the presidential election, brother farmers,—thank God for that! It has been a sin for a farmer to talk politics. I propose that for four years we forget and discard general politics, mercantile politics, manufacturing politics, and that we have four years of agricultural politics, and that farmers shall come to the front and say, "We have rights and interests that other classes shall respect, and in our interests the interests of all classes in the community shall be promoted." Therefore, send your own men to the Legislature. Not as politicians. If they want to go for that purpose, kick them out. If they are willing to go as men deeply interested in this primary and most important pursuit of mankind, and ready to do everything according to their intelligence to promote and to advance it, send them to the Legislature, and then let us have this experiment station in the interest of all classes. I know farmers will say, "Taxes are very high, we can't afford to make any additional tax, even for the benefit of agriculture." If there is any man who feels that way, who does not want to pay his share of the tax to support a first-class experiment station in Massachusetts, well equipped in every respect, if he will come to me, I will pay his share, if he is worth ten thousand dollars, and it will not cost me ten cents a year.

Now, I have put this matter before you. Think of it. Think of the work necessary to prove facts in agriculture; of the experiments needed; of the slow progress that, under existing circumstances, we must make; and say if we have not force enough, intelligence enough, and will enough in Massachusetts to have established for us, at the expense of the State, an experiment station that will aid in all this work. I thank you for your attention.

Mr. MOORE of Concord. After the long and able defence that the professor has seen fit to make of the Stockbridge fertilizers, I do not know that I shall say much about them. In regard to the claims of the farmers of Massachusetts upon the professor of agriculture and upon Professor Goessmann, I suppose they have no legal claims, and certainly it is to their credit that they are willing to do something in the way of experiment.

In regard to an experimental station, the trustees of the Agricultural College insisted upon having four hundred acres of land, and what was the reason they gave for wanting it? Why, for the purpose of making experiments, to teach those young men, and for the benefit of the farmers of Massachusetts. I know that to be so, because I was consulted in regard to it.

Now, as to the subject before the meeting,—manures and chemical fertilizers. The professor has devoted most of his time to the Stockbridge fertilizers, which is all very well; I have no fault to find with that. High culture is a necessity, in my judgment, to make New England farming profitable. You cannot have high culture without an abundance of manure, and the trouble you encounter on the farm is, that you are not able to get manure enough from the wastes of the farm to supply this want, and hence the necessity for chemical fertilizers, sometimes called "commercial fertilizers," but "chemical fertilizers" is perhaps the more proper name. In my judgment, farmers generally will be unable to get manure enough without resorting to chemicals. First, you must use all you can make and save on the farm, and then you must resort to chemicals.

This matter of chemical fertilizers was brought very clearly to my mind some twelve or fifteen years ago, by the translation of M. Ville's French work, issued by the Massachusetts Society, which laid down the doctrine that plants took from the soil certain amounts of phosphoric acid, potash and nitrogen. Those were the principal ingredients; there were some others,—magnesia, etc. Those theories of M. Ville were substantially the theories of Professor Stockbridge, as nearly as I can understand them; I may be mistaken. I made a great many experiments for my own satisfaction in connection with these theories, years ago. I think it is true, that you must supply substantially what the plant takes from the soil, and to do that, as I have said before, you must resort to something more than you are able to get on the farm.

Now, the fertilizers of four or five years ago were very unsatisfactory to farmers. In the first place, they were abominably adulterated. I say "abominably." I don't know as that expresses it strongly enough. But since the enactment of the law which was passed a few years ago, these fertilizers have become very much better, under the demands of the people, and under the analyses which have been made by Professor Goessmann, as the chemist of the Board of Agriculture. And I will say here, that the passing of that law was due to some members of the Board of Agriculture and to the president and faculty of the Agricultural College. I think they all had a hand in it. I know I had a finger in it, too, and a reasonably ugly fight on it in the Legislature. I say that, under the effects of the law, and the light that has been thrown upon the subject by Professor Stockbridge, Professor Goessmann, and others, these fertilizers have become much better articles, and more reliable than before; and the effect of attention having been drawn to them has been not only to create a marked improvement in the quality, but also a reduction in the price, and that, together with Professor Goessmann's experiments of last year and the year before, published to the world, enables farmers to go into the market and buy the cheapest fertilizers, no matter whether they are what are termed the Stockbridge fertilizers, or any other fertilizers.

That is what you want to know. If you can buy a fertilizer that is better and cheaper than the Stockbridge fertilizer, you want to try it. The Professor agrees to that, undoubtedly. He cares nothing about what you buy; he only wants you to buy the best.

Now, let me say, further than that, that the Stockbridge fertilizers, as they are called, are substantially the same things which I, certainly, had used before, and I presume many others had; not, perhaps, in precisely the same proportions. Professor Stockbridge does not claim that any of the articles are new, but simply the combinations, as I understand it. But Professor Stockbridge, in bringing this matter forward, has certainly done a great deal of good, and is entitled to the credit of it.

The Professor has given you to understand, that in seasons like this, when there is a drought, you had better rely upon chemical fertilizers, than raw, barn-yard manure. Now, I simply wish to say, that that corn which I have in the hall,—you know what it is, for you have seen it, most of you,—was grown on raw barn-yard manure. As near as I can judge, thirty-one horse-cart loads (almost five loads to the cord) were applied to the acre, on poor sandy soil, on the top of a hill back of my house. I cannot tell what the rainfall was, but it was very small. It has never been estimated and put down in inches to my knowledge. If on the college farm they have allowed a piece of low mucky land, or any other land, to suffer very much from drought, it seems to me it was partly their own fault. My corn, as I said, was planted on gravelly soil, and manured with raw manure, which the Professor says will not stand the drought so well as the chemicals, and my corn never rolled up. I will venture to say that there is not an acre of upland on that college farm that is not far superior to this poor land of mine.

Prof. STOCKBRIDGE. What is the subsoil of your land?

Mr. MOORE. It is first rate to make concrete of. It is gravel mostly. It is not really good road gravel. There is no clay to hold it together. It is seventy-five feet above everything else there is around there. I was going to tell you how to keep clear of drought. You cannot do it with every crop. You cannot do it on that land with a crop of strawberries or grass, but with a hoed crop, like corn, that you can run a cultivator through, so as to keep the ground stirred up, you are substantially independent of drought, because the effect of stirring that ground is, that it becomes dry on top, which acts like a mulch, and prevents the evaporation of moisture to a large extent. It certainly prevented drought in that case, for that corn never rolled up; and if it is going to roll up anywhere, it will surely roll up there.

So much in regard to drought. Now, I have one experiment that was made by Mr. Joseph A. Smith, a neighbor of mine, in Concord. I watched the experiment carefully, and know as much about it, perhaps, as he does. I do not know the cost of ploughing the land, because that is not put in. He planted three acres of corn. One was planted with Stockbridge fertilizer, costing $27.50, with the understanding that he was to have fifty bushels of corn over and above the natural yield of the land. Two-thirds of that was sown broadcast, and one-third was scattered in the hill or in the row. The product of that acre was thirty-two barrels, weighing 2,964 pounds. When you make an experiment, you want to know the number of pounds of the crop. You cannot get at it by measuring an ear, reckoning so many hundred ears to the rod, and so many quarts for so much length of ear. That is the way the Middlesex South Society made their great error in estimating Dr. Sturtevant's corn, which he corrected when he came to get at it accurately. Then the next acre was manured with Foote's phosphate. That cost $19.62, and was applied in the same manner, on the same day, and the corn planted the same day. The fields were side by side, and the soil a light sandy loam. The yield of that acre was twenty-nine barrels,—weight, 2,713 pounds. He says the fodder was about the same as on the other field. He had another acre of corn planted with manure. He says he has not husked that, and is unable to give the amount. He goes on to say: "I think I should have had more corn on Foote's fertilizer than I had on the Stockbridge, only the trouble that we ran against was, that we put too much in a hill, and a great many hills were missing; did not come up."

Now, I find on looking that over and calling seventy pounds of ears a bushel, that on the Stockbridge fertilizer he got forty-two bushels, where he ought to have had fifty bushels, besides the natural yield of the land; on Foote's fertilizer he got 38⅔ bushels. The Stockbridge fertilizer, mark you, cost him $7.88 more than Foote's, and on Foote's there was 3⅓ bushels less corn than on the Stockbridge; so that Foote's fertilizer would certainly be cheaper than the Stockbridge in that instance. That is only one instance, and perhaps the two fertilizers would not always show the same result.

Question. How deep was your land ploughed?

Mr. Moore. I presume the piece was ploughed as deep as ten inches. I do not ordinarily plough so deep as that. I do not believe you gain much, if you want to raise the greatest crops, by ploughing very deep. I will say that most of my land has been ploughed pretty deep. I had very deep ploughing on the brain at one time. I have got over that.

Question. Was your land greensward, and did you apply the manure in the spring or fall?

Mr. Moore. The raw manure was applied in the spring. It was old land that had been stocked with something else.

Mr. Ellsworth. What kind of manure was it?

Mr. Moore. It was raw manure from my cows, and some hog manure with it. I would like to add one thing in regard to barn-yard manure. Its whole value does not lie, perhaps, in the nitrogen, phosphoric acid and potash which it contains. Its mechanical effect upon the land is worth a good deal. For instance, Mr. Hill, one of the best market gardeners in Arlington, who is in the hall somewhere, would tell you that on his sandy loam, where he raises the very best vegetables and roots that are grown anywhere, he ploughs in raw horse-manure. Where land has been cropped, and the vegetable matter gone, the application of this strawy manure has a mechanical effect upon the land which enables the farmer to raise much better crops than he can with decomposed manure alone.

Dr. STURTEVANT. I agree in part with Prof. Stockbridge. In all the details of his theory there are a good many things I find we agree upon, and there are some things we do not agree upon. But those things that we do agree upon are things which have been determined by experience and practical results. I do not see that we gain anything by talking about chemical manures and barn-yard manures as if they were opposing substances, and necessarily in conflict. I do not look upon the question in that way at all. Barn-yard manures are good, are excellent; we all know it. There is no use discussing it. We all wish we had more of them than we have. We can usually apply them to a profit. Wherever any manure is worth anything, there barn-yard manure has a value. There is nothing to be gained by underrating barn-yard manure. But what have we done? Our agricultural meetings have talked of phosphates; whether they were better or worse than barn-yard manure. We have talked about potash salts; whether they were better or worse than barn-yard manure. What is the result of this whole matter? Simply this: that barn-yard manure is a complete fertilizer. We apply it to our soils, and we furnish to the plant all the food elements that it requires, and we get our crops. We apply a potash fertilizer to a soil which has an abundance of potash in it, and which is deficient in the other elements, and the result is failure; and a good many people say, "Well, that only proves that potash is not as good as barn-yard manure." The fact of the case is, that the two should never be compared together. The only fair test is to compare one complete manure with another complete manure,—barn-yard manure which contains all the elements of plant-food with a chemical manure which contains all the elements of plant-food. Then the question is, Which will produce the most, the chemical manure or the barn-yard manure? We want to use all the barn-yard manure we can save and all we can make on the farm, and use it in the most economical way. After we have used that manure, the question occurs to us, How can we get more manure? We have used all we have; we want to get the largest profit from our farm by making every acre productive, and by not having any idle capital in the land; therefore, we must have manure. What shall we do? Shall we buy barn-yard manure, or shall we buy chemicals? Chemicals have been proved to produce results in crops, under certain circumstances, equal to barn-yard manure. Witness Lawes and Gilbert's experiments in England, carried on for over thirty years. They applied fourteen tons of barn-yard manure to one plot each year, and to another plot they applied a certain mixture of chemicals each year. What has been the result? For fifteen years the chemical manure has produced the same crop as the land manured with barn-yard manure. In other words, there has been no difference in the result. The chemicals and the barn-yard manure have both produced the maximum crops on the land. There is a fact that can be depended upon in our practice. Under the proper conditions, chemicals and barn-yard manure will produce the maximum crops on the land. There is no getting beyond that. It is a fact, as definite and decisive a fact as we have in agriculture.

Now, where does the question come? Here we are, in this condition. We have used up all the manure we have. We want to get more manure. What is the question? The question is, Where can we get the balance of the manure that we need the cheapest? If we can get barn-yard manure cheaper than we can get chemical manure, then barn-yard manure is the best. If we can get chemical manure cheaper than barn-yard manure, then chemical manure is the best. Then comes in another question: Can we buy the chemicals at a price so low that we can raise crops at a profit? On my own farm, I have shown that it can be done, and no gentleman of the hundreds who have been on my farm and looked over my fields will deny it. You can see it. You can go into my corn barns and measure the corn, and measure the fields. Those fields have produced those crops. There is no question that you can use chemicals and use them to a profit, provided they are complete fertilizers, containing all the elements of plant-food. And, moreover, the land is improved by fertilizers, the same as by manure. In raising my corn with chemicals, I charge the fertilizer to the crop, the same as I do when I use manure, because it has been proved that this fertilizer acts just the same as manure. Where the first crop takes half, the next year it may take half of the remainder, and the remainder the year after. So you can manure for rotation with chemicals as well as you can with dung. That has been proved time and time again.

Now, under these circumstances, the only question for the farmer is the question of profit. "When I have used all the materials on the farm, and want extra manure, can I buy chemicals cheaper than I can buy barn-yard dung, and can I make a profit?" That is the only question. If he can make a profit, then he can make a successful farmer by tilling all his land which will admit of tillage.

Dr. WAKEFIELD of Monson. I have instituted a set of experiments this year on some eight or ten crops, at the farm of the State Primary School, for the purpose of ascertaining for myself whether I can afford to buy chemical fertilizers to produce crops. I have the result here. There are some failures and some successes. I have satisfied myself now whether it will be of any use, and when this is submitted, you can draw your own conclusions, as I did. In most respects, I think the results will corroborate the Professor.

I will first give you the result with onions. My bed of onions is from a third to half an acre. I have used this fertilizer on the same ground, and have compared it with the barn-yard manure which I use ordinarily on my crops. I took one-sixth of an acre and applied one formula, which cost me $6. I raised twenty-five bushels of onions. That is not a great yield. The balance of the ground was manured at the rate of sixteen cords per acre. I make my barn-yard manure as good as I can make it, by combining with it all the urine which it will absorb from the vault. It is as good, I think, as can be got. I have set the price of that at $8 a cord. Then the cost of the manure for an acre of onions would be $96. At the same rate, the barn-yard manure for the one-sixth of an acre where I used the commercial fertilizer would have cost $16. There is a balance of $10, besides the labor of handling. The whole yield of this third of an acre was in proportion of one hundred and fifty bushels to the acre. That bed was sown early; it had every advantage of cultivation that I can give any crop, and I never saw onions come up better; but the dry weather struck them down. I have not measured any of these crops, and I do not know how much was grown on this sixth of an acre; but I have measured the whole field, and I give you my judgment, and the judgment of my farmer, and everybody concerned. In that crop of onions we could see no difference between the part of the bed manured with the chemicals and the part manured with barnyard manure; and there was a great advantage in the cost and the labor of applying in favor of the chemical fertilizer.

Now, I will take potatoes. I had two fields. I took a quarter of an acre and applied $9 worth of fertilizers, and that quarter of an acre produced 55½ bushels of "Snowflakes." That was at the rate of 222 bushels per acre. The balance of the field was manured at the rate of eight cords to the acre, which, at the same price, would be $48. The fertilizer, to have manured an acre, would have cost $36, while this cost $48. I could not see any difference in those crops when they were growing, nor when they were dug. I should say that one was as good as the other. That I consider a fair yield. I do not think that crop suffered for want of water, although we were in just the same condition in regard to rainfall as they were at Amherst. We are only twenty miles from there. We keep a record of the rainfall at our institution just as they do at Amherst. I have not the figures with me, but I can assure you that we did not have a great quantity of rain, and I know you will agree with me when I say that we had a very hot summer. I have no doubt Prof. Stockbridge's figures were right, and I have no doubt that our figures, if I had them, would be about the same.

Then there was another lot of potatoes, which I consider a failure. The ordinary land of the farm, as you know, is good, and these potatoes were planted upon as fair a piece of land, I think, as there is on that farm. I applied $15 worth of the fertilizers to three-quarters of an acre, and I got fifty bushels of potatoes, Brigham's seedlings. I will say here, that Snowflakes and Brigham's seedlings have produced, for a great many years, larger crops than any other potato that I could raise; but they have run out, and I ought not to have planted them this year. The yield per acre was 66$\frac{2}{3}$ bushels. That is not a fair yield, and I attribute it a great deal to the want of rain. You cannot raise a crop of potatoes, any more than you can a crop of hay, unless you have that fertilizer, rain, applied to it. Nature generally gives us that in sufficient quantities; but when it ceases to fall, you are just as badly off as if you fail to apply manure. Nature has so ordered it, that no crop can be produced without a certain amount of rain. If that crop of potatoes was a failure, I think it was a failure because of the want of rain.

Take next mangolds. I had a field of mangolds of about four acres, and they produced at the rate of 620 bushels to the acre. There were 2,480 bushels of mangolds on that four acres. I took one end of this field, three-quarters of an acre (just the same land as the other), and applied $21 worth of this fertilizer, and on this fourth of an acre I got 390 bushels. The land on which I raised the 620 bushels per acre was manured at the rate of ten cords to the acre, making $80 per acre, at $8 per cord. I could not see any difference where the fertilizer was placed, with the exception of one corner, and I will tell you why I think that was. I had not enough of the beet fertilizer for that three-quarters of an acre, and, having some of the turnip fertilizer, I used that on that corner. I knew there was not enough potash in it, but I intended to make that deficiency good by applying ashes. I consider that if I had given that small corner piece a barrel of ashes, I should have had enough of that ingredient that was wanted; but I had not enough, and I only put on just one-half. I put on one-half of the formula for turnips, instead of using, as I should, the whole of the formula for beets. I could see that there was a decided falling off in that corner. I think the whole field suffered for want of rain. I know it did, just as well as all the rest of the crops in the region suffered; but I could see that where I applied the kind of fertilizer that I knew had not sufficient potash in it, there was decidedly less crop. It could be seen at the time of gathering; it could be seen at the time of growing.

Then the crop of carrots. I raised an acre of carrots, and I raised one-eighth of an acre on this fertilizer, which cost me $6. There were 62½ bushels on this eighth of an acre. The yield per acre was 497 bushels. I call it 500 bushels to the acre. The cost of the manure, at the price stated and the amount, was $80. The fertilizers would have cost $48. Now, I am clear that in the carrot crop there was a decided difference. You could see it in the growth of the carrots, and you could see it after the crop was gathered. After they were ploughed out, going through them (they were planted on the ends of the rows), you could see that those grown with the fertilizer were larger than the others. The cost of this fertilizer was only $48 per acre against $80 for the other.

Then take the ruta-baga crop. I planted one-eighth of an acre, and to that I applied one-half the formula for ruta-bagas, which cost me $3. It produced 111½ bushels. The yield to the acre was 892 bushels. It was manured at the rate of five cords to the acre,—$40. The fertilizer would have cost $24. I could not see any difference in the crop. The ruta-bagas raised on the fertilizer were just as good as those raised on the barn-yard manure. The whole produced at the rate of 892 bushels to the acre.

Then I tried an experiment with corn. I never have raised corn; I thought I could not afford to do it. I wanted to raise corn, because I wanted the fodder for my milch cows; but I never thought I could afford to do it. But I tried the experiment, because I had great confidence that other people had done it, and I did not know but I could do it. I have had to buy corn, but I supposed I could buy it cheaper than I could raise it. The fertilizer cost me $13.50. I planted half an acre, and raised forty bushels. When I gathered that I weighed it, and, at the rate of seventy-two pounds of ears to the bushel, I calculated there were forty bushels; but to make sure, I deduct two bushels and a half, and call it 37½ bushels. That is seventy-five bushels to the acre. Before I decided to plant that corn, I had manured the land for potatoes, but I concluded to try this experiment, and so it had, in addition to the chemical fertilizer, a cord and a half of barn-yard manure, which, at $8 a cord, cost $12. The manure on this half-acre cost $25.50. Thirty-seven and one-half bushels at seventy cents a bushel, would cost about $26.27. I did not make a great deal, but I got my corn-fodder. I got at the rate of two or three tons to the acre of corn-fodder, which I suppose is worth some six or eight dollars a ton, perhaps more. I consider that it is worth more to me for my milch cows. I calculated to get one hundred bushels of corn to the acre, and I believe that if we had had as much rain as we had in 1874, I should have had one hundred bushels of corn to the acre. Here is a specimen, gentlemen, of some of the corn that I raised.

Question. Is that a fair specimen?

Dr. Wakefield. I calculated to pick out as good ears as there were to be found. I did not bring down cow corn to show. The seed of this corn I obtained of Mr. Hadwen. He knows more about it than I do. It was the best corn that I knew of when I sent for that seed. I had seen and known something about his corn. I am inclined to think that if I had seen Captain Moore's corn, before I planted, I should have had his; but I don't know; I want to get the best I can.

Then, cabbage. I manured a quarter of an acre for cabbage, at a cost of $10 for the fertilizer, and raised 1,150 heads. We have an appraisal made every year of our products, and those cabbages were appraised this year at four cents a head. Some of them, I think, were larger than any you can see in the hall upstairs, and I should be very glad to buy cabbages as large as those at four cents a head, to feed to my cows. But that is the appraisal, and the product of that quarter of an acre amounted to $46. The yield per acre was 4,600 heads, which, at four cents a head, would amount to $184. Barn-yard manure, at the rate of eight cords to the acre, would cost $64. The fertilizer would cost $40. Now, those cabbages stand in the field to-day; some of them I have put into the ground, heads down; but while they stood there, no man, unless he had more skill than anybody I know, could have picked out the cabbages manured with barn-yard manure from those manured with chemicals.

Now for the grass. I have no definite data to give you in regard to that, only to say that I have used a ton of this fertilizer this year. I have used it on my lands, and I have used it on my grass fields, where I did not want to put manure. I cannot say how much additional hay it has given me, because I have not measured it, but I can say this much: every place where I put it, in the early part of the season, before the drought came on, I could see where it went, just as plainly as you can see, when you have sown a new field of oats, for instance, where your hand went,—where the seed was thick and where it was not.

I have tried an experiment with rye in reclaiming pastures, and I will tell you what I meant to do, and what, I guess, I shall fail to do. I took four acres of pasture, that had not been ploughed for twenty-eight years. It was quite stony, and when I went upon the farm, it was covered with brush, beeches, birches, etc. I had pulled them out, but it did not produce as much feed as I wanted it to. It had been improved, and I thought it should do better. I thought I couldn't afford to let it lie in that way. I turned it over, and took out rocks enough to build a wall on one side. It was a piece twenty-five or thirty rods square. I sowed it with rye, and thought I would try this experiment, and see if I could not reclaim this pasture. I sowed grass-seed with the rye, just the same kind that I should if I had intended to mow it the next year. I have let the cattle run on that field this fall, and it is looking very finely now. I applied this grass fertilizer at the rate of $10 worth to the acre. I calculated that the rye would take care of itself, the cattle would eat it off, and that would be an even thing, but I thought the grass ought to have some additional fertilizer to that which nature had given, it having been cropped by milch cows for a series of years. The rye is looking so finely, and I have so much confidence in my ability to raise corn with these commercial fertilizers, that I have concluded to fence that piece of ground, and, in addition, another piece which I have ploughed up, and I propose to plant corn next year, and manure it with chemical fertilizers, because it is way up on a hill,—although it is pretty flat when you get there,—so that you cannot haul manure up there, but you can take the fertilizers up on your back. I do not know how the experiment will succeed, but I mean to find out whether I can reclaim my pastures in that way. I think my cattle have got as much feed from the rye as they would from the pasture, provided it had not been turned over. What the result will be next year remains to be seen; but I provided for the pasture by applying ten dollars' worth of the grass fertilizer to the acre, which, according to Professor Stockbridge, should produce a ton of grass to the acre for the next crop. Whether it will do it or not, I do not know. That is one of my experiments, and I shall watch it with interest, to see the result. I am inclined to think now, the rye looks so well, that if I keep the cattle off, I can get a good crop of rye next year.

These things I have done for my own edification, to know whether I can apply these fertilizers and raise crops. I am satisfied that a man can raise a crop of mangolds or carrots or cabbages with these fertilizers, and can afford to buy them, after he has exhausted his manure. I think nobody can afford to lose a particle of barn-yard manure. I think every man should husband all the resources he has, and then he will not have enough. I do not suppose anybody in the Commonwealth has any better facilities for making manure than we have at the school, and we do not have half enough. We cannot make half as much as we want, and would like the privilege of buying as much as we make. We make four or five hundred cords a year, and we use it all, and then, as I say, we do not have half enough. We applied, last year, eight hundred cart-bucks to our mowing land, and it takes a great deal of the manure that we make for our crops. We keep fifty cows and over one hundred hogs, and all the manure they make goes to our grass crop.

Now, I have tried this experiment, and I am satisfied from the result this year, under these unfavorable circumstances from drought, that you can afford to buy these fertilizers, and that you will get a better remuneration than you can from your barn-yard manure.

Question. Have you ever tried the Brighton fertilizer?

Dr. Wakefield. I tried that last year, and got good results, but, I think, not as good as from the Stockbridge fertilizers.

Mr. Moore. Mr. Thomas E. Payson of Providence, R. I., is here, and I think this audience would like to hear from him.

Mr. Payson. I did not expect to be called upon to say anything, and do not know that I have anything to say. I have never used commercial fertilizers, in any way. I have been so situated that I have had an abundance of valuable manure, and, so long as I have that, I probably shall not go into the market to buy fertilizers. We get an abundance of manure in Providence. We make a great deal of manure, and buy a great deal. We buy manure there for $8 a cord, and we get good crops where we put on an abundance of manure. The farm which I cultivate is not a very large one. There are some twenty-five acres, and, in one way and another, I manage to sell twelve or thirteen thousand dollars' worth of stuff from it every year, beside what we consume.

Mr. BALL of Upton. I think the distinction between barn-yard manure and fertilizers has been very clearly brought out here. The question is not, Shall we discontinue the use of barn-yard manure? It is, Can we use these fertilizers as helps? There are many of us who cannot possibly make manure enough, and these fertilizers come in as helps. It seems to me that the experiments which have been made, where they have been made with accuracy, will go very far towards settling the important question of the value of chemical fertilizers to the farmer, and, therefore, I have been exceedingly interested in this discussion. We want to have facts accurately presented. We want to be satisfied that the experiments reported have been thoroughly and carefully made. It makes a great deal of difference whether an experiment is properly made or not; whether you estimate a crop or weigh it; whether you know exactly what the cost is, and exactly what the return is, in this matter of fertilizers.

I only rose to say, that in the town where I live,—a small town,—we have a good deal of interest, just now, in agriculture, and, of course, we are interested in chemical manures, from the fact that we do not have enough barn-yard manure. We cannot make enough, and, therefore, this is a question that we are particularly interested in,—whether we can supply the want by the use of chemical fertilizers. If I had as good an opportunity to make manure as some gentlemen have, I do not think I should go into the market to buy fertilizers; and yet it seems to me that there are times when we may use chemical fertilizers that will do our crops more good than some barn-yard manure, as far as the first year's products are concerned. I had a neighbor who kept one old horse and a cow. He had a meadow of four acres that he cut every year, and run the hay through his old horse during the winter, and fed his cow on better hay, and he used to take the manure from his horse and put it on his land. He never fed any grain. Is it likely that an experiment tried with that manure would show the same result as an experiment tried with manure from good stock, fed on good hay and grain?

Now, as far as these experiments are concerned, I am going to speak of number one in this matter, simply because we want to talk about what we *know*, rather than what we guess at, and I want to make this statement. In our town there are some six or eight men who have made careful and thorough experiments with regard to commercial fertilizers, during the past year, and I give you this as the result for one. I looked around for an acre of land, and I wanted to take land that was as near waste land as possible. I did not find exactly what I wanted, but I found an acre of land with gravelly knolls in it. The soil was a sandy loam. What the subsoil would be called, I have great question. It is leachy land. My neighbor, Mr. Knowlton, lent me an acre of land for this experiment. It was in grass, and I asked him what the crop was the year before. He said, "Not enough to pay for the mowing. You may have as much of that land as you have a mind to cultivate." I proposed to take just one acre. I went on and measured off an acre exactly. It was ploughed six inches and a half deep, and turned over very handsomely, there being no stone on the land, except those small gravel stones. A light roller was put on, the sod was all rolled down, and then harrowed with a Randall harrow, and the fertilizer sowed on the land. I took a great deal of pains to have the fertilizer equally distributed over the acre. Then the harrow was put on, and it was thoroughly harrowed, and then the rows marked out with a plough, three feet apart each way. There was nothing put into the hill, and nothing put on the land save the fertilizer, according to the Stockbridge formula, which cost me $28.50 on the ground. Then the corn was put in. It came up rapidly, though not so rapidly as it would if I could have put some fertilizer or manure in the hill; for right beside me my neighbor, Mr. Knowlton, planted his, and put manure in the hill, and I noticed that it started quicker than mine; but after mine started there seemed to be great growth in it. I could not help watching it with great pleasure from the beginning. When the time came for hoeing,—I was hardly aware that it had approached that point,—it was some little distance from my house, and I found that it had grown higher than I expected,—I ran my cultivator through it both ways, and hoed it thoroughly. After that, I again found that the growth had been so rapid, that I thought I could only cultivate it another time, and I ran my cultivator through it each way, and then put a man upon it, and he went through the field almost as fast as he could walk, hoeing it the second time, and that was all the cultivation that it had. My neighbors laughed at me a good deal. One man said, "I knew a minister who planted beans, and after they came up, he pulled the beans up and stuck them in the ground again, thinking they had come up the wrong way." My neighbor, who lent me the land, said, "How is this? Do you carry your fertilizer in your pocket?" Another man came along and said, "You have put your hills three feet apart each way. I guess you will have a great crop!" I bore it with all the equanimity possible under the circumstances. When I harvested the corn, I weighed every single bushel of sound ears, and found that I had, reckoning seventy-five pounds to a bushel of shelled corn, 60⅔ bushels of shelled corn to the acre. That was the result of my experiment.

My neighbors have had better success. Mr. Valorous Taft, well known in this county, has made an experiment on two pieces of land, following nearly the same routine that I have described with regard to my own experiment, and he has raised at the rate of ninety bushels to the acre on one piece, and on the other at the rate of sixty bushels per acre. I have another neighbor who has tried different fertilizers, using the Jackson fertilizer, the Stockbridge fertilizer and the Brighton fertilizer. I will only say, that in all the experiments that have been made, the results have come very nearly up to the promise made by the formula when we started; to wit, that it would give us at the rate of fifty bushels to the acre, besides the natural yield. But I want to say, that everywhere in our town, notwithstanding what my friend Stockbridge has said, we had fine fields of corn, whether raised upon barnyard manure or upon chemicals. Right beside me, I think, my friend, Mr. Knowlton, had a crop nearly, if not quite, equal to mine, raised upon his fine manure. He did not weigh the crop, I believe, and therefore I am not able to say whether it was exactly equal to mine or not. Until the drought of August came, it seemed as if the crops planted with the fertilizer had the start of those planted with manure. When the drought came, as far as I could judge, the fertilizer did not seem competent to carry through the crop any better than manure.

I have been interested in this matter a long time. The book to which Captain Moore alluded is a book that has been in my library for years. I have read it with a great deal of pleasure, but never until lately has this matter assumed such a form that it seems to me it is in the power of every farmer of ordinary intelligence to take these chemicals and go into his field and expect, at any rate, a fair average result, and nearly in accordance with the formula as presented; and therefore it seems to me that it is only just that these facts should be collected from every quarter and brought together, to show just what the law is that we can apply everywhere and be sure of our results.

Mr. ———. I want to ask Professor Stockbridge how the fertilizer should be applied to pasture land, and what is the value of the fertilizer as compared with manure, at $8 a cord for three years, provided the manure can be conveniently obtained?

Prof. Stockbridge. When the gentleman speaks of "pasture land," I understand him to mean the old, rocky hillsides, where we cannot draw manure, and which we cannot plough and renovate in that way.

Mr. ———. I have pasture land that can be ploughed,—sandy loam.

Prof. Stockbridge. On rocky land, over which you cannot drive a yoke of cattle, I would sow the fertilizer, and then haul an old-fashioned drag over it, to tear it up more or less, and then I would sow grass-seeds,—both kinds of clover, redtop, blue-grass, bent, and a very little herdsgrass. I would not sow the fertilizer on one of these old pastures without first tearing it up and reseeding. Now, about the land which you can cultivate,—land which is good land, which you call pasture-land,—all you have got to do is to take it in, and make it a part of your farm, plough it, till it, seed it down, and the work is done.

Adjourned to two o'clock.

AFTERNOON SESSION.

The Board met at two o'clock, and the discussion was opened by a lecture on—

VEGETABLE-GARDENING AND ROOT-CULTURE.

BY BENJAMIN P. WARE.

Mr. Chairman and Gentlemen of the State Board of Agriculture:—The subject of vegetable-gardening and root-culture has twice been presented to this Board within six years,—very ably presented,—first, in 1870, by J. J. H. Gregory of Marblehead, and in 1874, by O. B. Hadwen of Worcester, both gentlemen of experience and ability, and it may seem useless, perhaps, to go over the same ground again; but I suppose the importance of the subject is the apology, if any is wanted, for again presenting it to your consideration. I have no royal road to offer by which you may avoid labor or the risk of disappointment in the culture of these crops, but I have a life-long experience, and hope I may be able to show, by that experience, some improved methods of culture, having in view especially the saving of labor, as the cost of labor is, apparently, the great obstacle to the success of the Massachusetts farmer; and I shall endeavor in my remarks to show you some methods by which the same results may be obtained, with, perhaps, in many cases, one-half the labor.

I propose to speak upon the standard varieties of vegetables that are grown, giving, as far as I know, the origin of them, the most approved methods of culture, as I understand them, and something in relation to the markets. First, I would like to present to you the present condition of the market for vegetables. A great change has taken place within a few years with regard to the demand and supply of what we call vegetables to supply the market. The facilities of transportation, by the various lines of railroads and steamboats, permeating all parts of the country, are now so great, that a deficiency in one part of the country is immediately supplied by another. Formerly, when a short supply occurred, the farmers were enabled to obtain an increased price for their productions; but to-day, the perfection of transportation is such, that should there be a short crop in one part of the country, it is immediately supplied from another part where there is abundance, so that at the present time there seems to be no chance for growing any crop,—onions, if you please, or other crops,—as there has been heretofore, except at a small profit. It is not many years since I unloaded loads and loads of squashes and cabbages in Boston markets, and saw them filled into barrels immediately, and marked "Worcester." But such a thing, as you well know, never occurs now. I remember very well furnishing cabbages and onions, and various other crops, that were sold to go to Maine, New Hampshire and Vermont; but to-day these States not only supply themselves, but are ready at any time to fill up any deficiency that may exist in our market. Some years ago, the markets of New Orleans and Mobile were the principal openings for our onion crop; but in a little while they were abundantly supplied from up the Mississippi River, where they could grow them at a great deal less cost than we could here in New England, and float them down in their flat-boats, and that market was shut to us. More recently, Philadelphia and New York have been the great openings for the surplus of our crops; but last year, onions (I mention this crop especially to illustrate the change in the market) started at $2.50 a barrel, and many were sold to go to the Philadelphia market at that price; but all at once the Philadelphia market was glutted with onions from Michigan, at a dollar a barrel, which knocked the price down at once in our market, and we poor farmers of Essex County were obliged to submit. A year ago, early cabbages were bringing a handsome price, a remunerative price, in Boston market, and farmers felt that they were going to be enabled to reap a rich reward for their labor in the cabbage crop; but all at once, two or three or half a dozen car-loads of cabbages came in from Portland, knocked the price down at once, and shocked the market in such a way that it never recovered. A few years ago, the squash crop was one of our main dependences. We were sure of a good market for any amount that we could raise; but of late years, the farmers of Michigan and other Western States have been raising squashes, and they frequently send them into Boston in such quantities as to glut the market, and are obliged to sell them for what they can get, which sometimes is so low that little or no returns are made to them, and making the market very uncertain to us. So, at the present day, it is almost as important to discuss what shall we farmers grow, as it is, how shall we grow it.

This year, as you well know, we have all suffered very seriously from drought. Many of our crops in Essex County have been cut off entirely, and yet the price has not advanced in proportion, because in other parts of the country the supply is abundant, and for that reason there is no chance, as it seems to me, for us to get the opportunities that we once had, so that we must consider especially the wants of our home market. How best to supply that is the question. We must wait, it seems to me, for future developments before we can determine to what crops we may devote our energies to the best profit. A few years ago, you farmers will remember, it was quite important to get early potatoes into the market, and early pease, but now it is useless for us to attempt to grow either earlier than we can get the largest product with the crop. What I mean to say is, that we must not endeavor to put our crops in so early as to sacrifice quality for the sake of getting them a little earlier, for the reason that early potatoes and all early vegetables are coming in from Norfolk and the South, and so along, following the shore, much earlier than we can possibly raise them, and potatoes can be introduced into our market ripe, and in first-rate condition before we can possibly bring in our unripe and ill-grown early potatoes; so that it is not much use for us at the present time to attempt to grow these things very much earlier than will enable us to produce the best and greatest results.

I will say one word in regard to the potato. I am very sure that, by high cultivation,—that is, by using an abundance of manure for the cultivation of the potato,—we seriously interfere with the quality of the crop. We may get greater results, but we have not the quality. We, in Essex County, who have been in the habit of supplying the Boston market and others with potatoes, have been anxious to produce as large crops as possible, and as early; but we do not pretend that we can raise potatoes of such good quality as come from the State of Maine and other places. I am satisfied it is the result of over-manuring, for I know many cultivators who use little or no manure in their small private gardens, who get potatoes of very excellent quality, though very small crops. I will say here, that it is a fact which I know to be true, that a good quantity and quality of potatoes can be raised from Peruvian guano alone, year after year, on the same land. That is a fact worthy of consideration.

As to the method of cultivation, probably you are very familiar with it, and I will only mark out, in a few general remarks, the principal features. If any one cultivates the potato very largely, he may use to advantage Drew's potato-planter, which cuts, drops and covers the seed at one operation; but it would not, perhaps, be advisable for small farmers, who do not have large fields, to incur the expense of that. But potatoes can be grown with little or no hand-culture, and the method is this: After ploughing the land, spread the manure on the surface and harrow in; furrow out the rows three feet and a half apart, and have them as nearly equal distances as possible; drop the potatoes; cut with two eyes in a piece, ten inches apart in the rows, and then cover them with a plough, and the planting is done. Just before the potato comes up, go over the field with a drag, which I will explain pretty soon, and level off those furrows, leaving a smooth, plain surface, and destroying the first crop of weeds that break the ground; then, in a few days, the potatoes will come up, looking fresh and bright. The after-culture may be done with some of the various potato-hoers, or cultivators. There are plenty of such, and it is not worth while for me to go into a description of them. You are all familiar with the different kinds. But the after-culture, as I say, may be managed entirely with the horse and these potato-hoers, or cultivators. Then, in digging, there are potato-diggers that work to advantage; but if you do not think it advisable to get a potato-digger, plough a furrow each side of a row, turning it from the row of potatoes, and then with the potato-hoe, or forked hoe, the digging is very easily done; or you may go through the centre with a double mould-board plough, and throw them all out, and pick them up; and afterwards go over it again with a cultivator, and you may get nearly all the potatoes with very little labor.

I think I will next take the onion crop, because the system of growing the onion will apply to many other crops. In the first place, I will remark, that we have an onion that was perfected in Danvers. By a great deal of care, the Danvers onion has been perfected, and probably it is the best onion that has ever been grown for profit by the farmer. I will admit that it is not quite so good in quality as the cracker onion of Rhode Island, but for a crop for sale it is as near perfect, I think, as can be obtained. You will observe that it has a very fine, perfect form, small top, and beautiful in appearance. Mr. Daniel Buxton of Peabody has the credit of perfecting that onion. The best method, as I understand it, of raising an onion crop, is this: Spread your manure in the fall, and plough it in five inches deep. It is not well to plough deep for onions. The best crops for the onion to follow are carrot and potato crops. The onion may be grown on the same land year after year. The longer they are grown on the same land, the finer they are, the more perfectly they bottom down, and the smaller the top. You will find in some cases that your onions will not bottom down so perfectly and develop so well as you desire to have them. You want to know what is the matter. You have either got poor seed or your land is not in proper condition; that is, it has not been cultivated long enough, or your manure is too green. I will say here, that in my opinion (I know there are some who will differ with me), to produce the best results with vegetables, it is necessary to have fine, well-rotted manure. I shall not discuss at all to-day the question of the use of fertilizers, but I shall proceed to talk upon the raising of vegetables in the old-fashioned way, with manure. Not that I would have it understood that I am opposed to the use of fertilizers, for I believe that great good will result from the introduction of fertilizers based on sound principles, like the Stockbridge fertilizers, that have been discussed here this morning. But to ensure good crops of onions, or of any vegetable, we must have good manure, and plenty of it. We must have good land, we must have good culture, and, above all, we must have good seed, without which success is impossible.

I had got as far as manuring the land in the fall of the year. If you have manure, put it on in the fall of the year, and plough it in; and in the spring, as soon as the land is dry enough to work in a comfortable way,—never work land in the spring when it will work clammy,—go over the ground with a revolving harrow (we call them pulverizing harrows), which will do the work sufficiently, without any ploughing, and do it very effectively, leaving the land in perfect condition for after-cultivation. After this pulverizing harrow has done its work, then go on with the drag, which I shall explain directly, drag the ground down smooth, and sow the seed, sowing from two and a half to three and a half pounds to the acre. After that, of course, the crop requires careful culture, and I will pursue the weeding and harvesting of the onion crop at this time, and finish it up, which will bring out an explanation of some of the implements that are used.

I will commence with the drag. I have made a small model of a drag, for the reason that I found it rather difficult by words to make myself clearly understood by persons who had never seen a drag of this kind. This model is supposed to be eight feet long, and three and a half feet from that point to this, in width. This turned part, representing the front part of a sled, is one foot wide, made of two-inch spruce plank. Here are three by four or three by five joist, spiked across the drag at equal distance from the ends, with a staple in each, to which the chain is attached. The horses are hitched to the centre, the man riding here. This drag will break up the lumps and leave the ground in better condition than it can be put by raking, and with very little labor. And above all, do not forget, in the construction of this drag, to nail a narrow cleat lengthwise of the centre of the drag, which may be a strip of board, one inch by three. The importance of that is, that it fills all the tracks of the horses. That little cleat drags the surface of the ground before it, and fills all the little irregularities. It will kill the first growth of weeds that comes up, before the seed of potatoes, corn, pease and other crops have appeared, and it answers the purpose of one hoeing. You can hoe an acre the first time in an hour, or as fast as two horses can walk. It will cover two rows at a time, and do the work perfectly. This drag can be made by any farmer, with an axe and a saw and one dollar and twenty-five cents' worth of material, in an hour or an hour and a half, so that every farmer can have one without going to his neighbor to borrow. It takes a great deal longer time to go to a neighbor and borrow a drag, and carry it back (which, I am sorry to say, is not always done), than to make one. So I advise you all to make one for yourselves, and not depend upon your neighbors. I believe there is no labor-saving implement of greater importance to the market gardener than that simple drag, which will cost not over two dollars, labor and all. I have used one for many years, and am finding new uses for it every year. I don't know how I could get along without it.

After the ground is prepared by the drag for the seed-sower, sow your seed. I use, for sowing all kinds of garden seeds, Willis's seed-sower. We farmers have found it necessary not to depend wholly upon the agricultural-implement makers for tools. They have made vast improvements, and the agricultural stores have almost everything you can think of, but they have not got some things that we farmers in Essex County think we must have, and in order to get them, we make them ourselves. I took Willis's seed-sower as a basis, with which you are all probably familiar, and made one myself, for the purpose of using some of these new and improved fertilizers. It is very important that the young seed, when it first starts, should start with vigor and power. Therefore, it wants a fertilizer that will act upon it immediately, and give it a push forward that it will not forget through the whole season. If you have your seed in a seed-bed, where it cannot get at the manure for two or three weeks, the weeds will get a start, and it takes a long while for the tiny vegetable to get over that check which it has received. Therefore I would urge the importance of applying a fertilizer that shall be adapted to the immediate use of the crop, and be assimilated immediately where the seed is dropped. In order to do that, I have made a machine with a double hopper. I put the seed in one side and the fertilizer in the other. I have tins, with holes of different sizes, so that I can put the seed in just exactly as I want it, and with holes a little larger, I can distribute the fertilizer just as I want it. The seed and the fertilizer go into the furrow at the same time, and are covered at the same time. It is admirably adapted to the use of the Stockbridge fertilizers, the Brighton fertilizer, and some of the very best superphosphates in the market may be used to advantage, but with which I have been sometimes so deceived, that I have become somewhat discouraged in their use. But I think there is a brighter day dawning upon us, when we shall be able to use some of these improved fertilizers, with the assurance that we are getting what we pay for; and for that reason, I think this implement is exactly adapted to the wants of farmers to-day.

I believe I have got the onions sowed now, and the next thing is to take care of them and weed them. You have all probably seen a truckle hoe, but I have never seen one in any agricultural-implement warehouse that was nearly as good in construction as that made by a wheelwright in Peabody, where this implement which I show you was invented. Although it is homely, it has been used a great deal. A man can hoe between the rows of onions with this as fast as he can walk, and do the work well. Then the next thing is to weed these onions. We want a weeder to do it with, but we do not want to go to an agricultural-implement store for it, for it is not to be found there; we must make it ourselves. There is a little implement that I made in about fifteen minutes. Take an old hoop that has been on a paint keg, which has exactly the bevel you want, as you will see here. [Mr. Ware exhibited the implement, consisting of a hoop in the shape of a triangle fastened to a short handle.] A man will make half a dozen of these in an hour, and it is one of the best things to weed with I have ever found. Perhaps many of you may have something better, but this is the best thing I know of. It is an article that we make ourselves, and it answers the purpose admirably.

Question. How far apart do you plant onions?

Mr. Ware. Fifteen inches apart. Then, after the onions have been weeded twice, they have got to be pretty good size, you think you have got through your weeding pretty well and can go haying, and feel very comfortable about it. You go to haying, and after you get through, you will find purslane so thick that you will be astonished. Here is another implement which I have made, for there are none in the market, for the purpose of weeding. It is an implement similar to the truckle hoe I exhibited before, but with taller wheels, and it is so arranged with small ploughshares that you can set it narrower or wider as you wish, and by running it carefully straddle of the row, you throw a little furrow up on each side of the onions, or carrots, or beets, or whatever you have, and throw a little dirt upon the small weeds and kill them. But you may ask, "Will not the piling up of the earth kill the vegetable?" The vegetable must be large enough, so that throwing up the furrow will not cover the eye of it. The dirt should be thrown up so as to hill up the vegetable slightly. Then, in a week or a little more, when the small weeds have been killed and others have started again, just reverse it and throw the furrow back again away from the vegetable, and you do a day's weeding with this machine in a very short time, by simply walking along. It does the work very well, and at a season when you cannot well spare the time to do it in any other way,—just as haying begins.

The onions are now, we will say, weeded sufficiently, and if the seed is right, if the manure is right and the land is right, in a little while the tops will begin to droop preparatory to ripening off. But if you have made a mistake, if your seed is not very good, if the manure you have used was a little too green, or if the land where you have sowed your crop has not been prepared properly by previous cultivation, and by reason of this the onions are stiff-necked, proud, haughty, will not yield to circumstances, and they stand bolt upright, you must overcome them. Take an empty flour barrel with two heads, and a hole bored through the centre of each, with a hoe handle for an axle-tree and a handle on each side, and use it like a wheelbarrow, walking over the field of onions and breaking down the stiff-necked ones, and then they will be inclined to ripen off. They will not be so perfect as they would if the tops had fallen naturally, but they will be good onions; whereas, if you do not pursue this course or some other, they will be of no use whatever.

In harvesting onions, we pull them, putting six rows in one, but not too thickly. If the ground is a little foul with weeds at that time, we take an old scarifier frame, with the teeth out, and go to the blacksmith's and have a steel cutter made, as long as the scarifier frame is broad, and attach it to the frame. Then, when we have cleaned the space of six rows, we hitch a horse to that cutter, which works like the truckle hoe, and go over the surface of the land, cutting about two inches deep, and then rake up the weeds, and proceed as before with six more rows. After the onions have remained there a few days, or a week, if it is dry weather, they should be turned over with a rake with wooden teeth, care being taken not to let the rake-teeth pierce the onions, as they frequently do, for every onion that is pierced is injured or spoiled. When they are dried as thoroughly as possible, they may be carted to the barn or shed. If you choose to top them in the field, very well, but we generally gather them into the barn. They will bear placing in piles three or four feet deep if sufficiently dry, but they must be put in a dry place, where the air will draw through them and continue to dry them. Thorough drying is very important, and a necessary preparation for keeping.

Question. Can anything be done for the blight?

Mr. Ware. There is one disease which appears to be a blight, but which is not. The severe drought of last summer brought what appeared to be a blight upon the onion crop, but by careful examination it was found to be caused by a little insect, much like the aphis. I presume it is not the aphis, although it resembles it very much. They always appear in a dry time, and multiply so fast that they will spread over a whole field in a few days. I have seen an onion field that appeared in a perfect condition of growth entirely destroyed in ten days by the ravages of this insect in a very dry time. If the gentleman alludes to smut, which sometimes attacks the onion crop, I will say this: The smut is a disease of the land, and after a piece of land has become impregnated with the spores of the fungi that we call "smut," it is no use to attempt to raise onions there. It will not do to use a plough or any implement on that land and then take it to another piece where you are going to have your onions without first perfectly cleaning it. The spores of the fungi that cause smut in onions, which are invisible to us, can be taken from one field to another, and are just as sure to be propagated as the seed of anything else. Therefore, if you have smut on a piece of ground (which is probably the blight to which the gentleman alludes), stop growing onions there for several years; lay it down to grass, and raise your onions somewhere else. And, as I said before, be sure not to let an implement be taken from one field to another, or you will carry the spores or seed of the fungi with it, and your other land will be impregnated with the disease. The wash from high land where these spores exist will carry them to lower land, so that you must exercise great caution in this matter. These are the only two blights that I have in my mind.

Question. What is the remedy for the onion maggot?

Mr. Ware. The maggot has been and probably will be the great curse of the onion grower. I know of but one remedy. I will say here, that I believe, of all men in the universe, there is no class who are so willing to unbosom themselves and tell all they know, and perhaps a little more, as farmers, and I believe that it is to that we owe, in a great measure, the trouble I have spoken of with regard to marketing. There is a great deal of information circulated by the reports of such meetings as these, and by the transactions of the various agricultural societies. In order to get a premium from the agricultural society in Essex County, for instance, farmers must make a clean breast of the methods by which they produce their crops, and that becomes public property. The farmers in Maine, Vermont and New Hampshire have thus learned how to raise onions and other crops as we do in Essex County. Therefore, our market is cut off. You here in Worcester have learned how to do these things just about as well as we in Essex County, and therefore we can no longer supply your market with vegetables. However, I will say that I believe I have discovered a remedy for the onion maggot. I have never said much about it, but I believe it is a good thing. In the first place, the onion maggot is produced by a fly resembling somewhat our house-fly, but smaller. You will see them in your field just before your onions come up, as you walk along, and they will fly before you, but they will not go more than six or eight feet before they will light. As soon as the onion comes up, they will deposit their eggs, six or eight in a bunch, either right on the little onion itself, or on a small lump of earth near by. They seem to understand the necessity of a favorable location. These eggs will hatch just exactly at the right time. Then the little rascals, so small that you can hardly see them, seek a livelihood,—which is perfectly natural. They are not strong enough to eat directly into the onion, but they seem to understand the circumstances perfectly. They will follow the side of the onion down to get at the bottom, where the roots come out from the onion. The onion is formed by layer after layer, and right in the centre there is an opening directly into the heart of the onion. There is naturally a little opening there, so that these little maggots can crawl in without having to eat in, and when they get there, they are perfectly satisfied, and there they eat the heart of the onion. Their neighbors will come in, and by and by one onion will have a dozen or more maggots, and that is death to the onion. They will kill one and go to the next, and so on. I have studied their habits a great deal, and I felt that if a way could be discovered to prevent their getting into the onion, it would be all right. It occurred to me that if the seed of the onion were planted so deep that these little maggots, that are so delicate and tender, would not be able to get down so deep to enter the heart of the onion, they might be headed off and their plans frustrated somewhat. Well, that is so. That is the remedy. But in attempting to get the benefit of that remedy you may lose your crop. If you plant your onion seed more than two inches deep, the seed will not grow. We ordinarily plant it about an inch deep, but it is safe to put the seed in about one and a half inches deep, not more, and two if the seed is first rate; most of it will come up. In planting it that depth, it is necessary to use a little more seed, because some of it will not grow planted so deep as that; but that, I believe, is the only remedy against the onion maggot.

Question. Will you please state what kind of soil is best for the growth of onions?

Mr. Ware. A soil with a little clay in it. Good corn soil would be good land for onions. I have known very large crops of onions grown on land that was clayey, that would bake in a dry time. I do not recommend such land, because it is very difficult to work it; but I have known large crops grown on such land. I will say here, that a crop of onions varies all the way from 250 to 1,000 bushels to the acre. Five hundred bushels is a very good crop, I might say, a first-class crop, but we do sometimes get 600, 700, 800, 900, and even 1,000 bushels to the acre.

Question. Would not lime have a good effect upon smut?

Mr. Ware. I doubt it, but I cannot answer positively. The better way is, if you have smut in a piece of land, to change your onion field to another piece. If your land is impregnated with spores of the fungi, the smut will destroy your whole crop, and you had better give it up, and take some other land.

Question. Is salt a good fertilizer for onions?

Mr. Ware. Salt is a very valuable fertilizer for onions, for carrots, for mangolds, and for cabbages. I do not know that I should recommend it for other crops, especially. We in Essex County use a great deal of salt manure in raising onions, but I do not think that salt is so especially adapted as a fertilizer to onions as to the three crops I have mentioned,—carrots, cabbages, and mangolds.

Question. How is it with wood ashes?

Mr. Ware. Wood ashes are good for anything, always, every time; the more the better. I will next consider the carrot crop. I show you a sample of what we call the "Intermediate." It is a hybrid between the short-horn and the long orange carrots, very much better than either. The farmers of Danvers and Marblehead have the credit of producing that carrot. It was produced in both places about the same time, probably from consultation and talking together, as farmers do sometimes when they meet in the market-place. The farmers of Danvers and Marblehead are wide-awake to obtain new varieties, and you will find before we get through that Marblehead has done a great deal towards producing many of the very best of the standard vegetables in the United States. This is a medium and fair sample of the Intermediate carrot.

And I will say here, that no vegetable I have shown here is an exaggeration, by any means. The drought has been very severe in Essex County, and our vegetables have not been overgrown. It has not been my endeavor to produce here large specimens, but simply good specimens, showing the varieties in perfection. This, I say, is a good specimen of the new carrot. It has a small and short top, which is very important. You will go by a field of carrots sometimes, where the tops are up to your knees or higher, and you will think that that man has an immense crop of carrots, but when he comes to dig them, you will find they are almost all tops, with very little bottoms. You will find a great many of those carrots will have run up to seed, which they should not do. That is the result of bad seed.

The ground for carrots may be prepared very much as for onions. It is not so important to put the manure on in the fall; but if you have manure, it is not a bad place for it. It is not well to plough deep even for the carrot crop; better results are obtained by ploughing shallow. The manure should be applied early, and ploughed in, I will say, six inches deep, and then the land allowed to lie until about the 25th of May. You may plough the land any time in April, when you can best attend to it. By ploughing it then, and getting your manure in, you get one good crop of weeds started before you put your seed in at all, which is very important, and no labor has been expended for it. Then, when you get ready, plough your land the second time, which will put the manure near the surface, where it belongs. Then harrow and drag, as I explained before, and your land is in perfect condition for the seed-sower. If you sow your seed accurately and correctly, one pound of good seed is sufficient for an acre. If you put in too much seed, a great deal of labor is required to thin out the plants, more labor than weeding, so that it is very important to sow just the right quantity of seed. And I will say just here, that the straighter you have the rows, and the nearer they are of an equal distance apart, the more easy the cultivation, and the better you can use the implements that I have shown. It is very important to have straight rows in order to use these implements successfully, so that care in sowing is very important. I would sow the seed about the

25th of May; but if you get them in by the 10th of June, it is early enough, provided the weather is not very hot and dry about that time. I have noticed that we are apt to have a very hot spell about the 10th of June, and if it is very hot and dry at that time, the little carrots are so delicate that the heat of the sun will burn them up and kill them. Therefore, I do not recommend waiting until so late as that. The 25th of May is a very good time, or within a few days of it. They should be carefully weeded and kept clean. About the time of the second weeding, or perhaps the third, if the land is very weedy, the carrot-tops get so large that they cover the ground pretty well, and then the weeds will not grow. Carrots grow rapidly. Late in the fall, as late as October, they will make the largest part of their growth. The latter part of August, these carrots that I show you had made very small growth. They had come up and grown a little when the hot weather and drought came, but they had no hold upon the ground, and it hardly seemed as if one of them would live. But as soon as we had rain, along in the early part of August, they began to start, and then we had a few rains, and those carrots made all their growth after the 10th or middle of August, and most of it in October.

Question. How much does it cost to grow and take care of an acre of carrots, after they are planted, and pull them, and put them into the cellar?

Mr. Ware. I cannot tell exactly, but I will tell you what it costs to harvest them. Some farmers recommend sowing carrots twenty-two inches apart, but I think that is a waste of land. They will grow just as well in rows fifteen inches apart as twenty-two inches or two feet. Carrots are so constituted, that if there is a bunch growing together in one place, they will crowd themselves out each way. I have seen carrots so crowded that they would be square instead of round. It is not well to have them so thick as that, but where everything is favorable, if there is a bunch side by side, they will crowd themselves out, and make room for each other. Each one says to his neighbor, "Move a little," and they elbow each other round and get room, and grow to good size, even if they are pretty thick in bunches.

In regard to harvesting, I will say that my experience and observation warrant me in saying that it is safe to leave the roots in the ground until the 13th of November. I have known the ground to close up on the 13th, 14th, or 16th, a great many times, but it is very rare indeed, in our part of the State, that roots are not safe in the ground up to the 13th. We may have a little freeze before,—perhaps we did this year, —but it will be warm afterwards; but it is not safe to run the risk of the ground being open after the 13th of November. Therefore, I commence harvesting my carrots about the first of November. My method is this; and I will be particular in describing it, because I claim that it is a great improvement over the common practice. In the first place, take a long-handled square shovel, and grind it sharp. A man will go along with that shovel and cut off the carrots, a row at a time, as fast as he can walk. When the tops have been cut, rake them up in piles and cart them off to your barn, and feed them out to your cattle and horses. They are excellent food; if you do not need them for that, they make a good mulching for anything you want to cover during the winter. When you have got the top out of the way, then take a subsoil plough to loosen the roots. And, by the way, that is the only use to which I could ever put a subsoil plough,—one of those common, old-fashioned, lifting subsoil ploughs. Take two horses, and run the plough just at the left of the row of carrots. They are already topped, you will understand. This subsoil plough lifts them out of the ground about two inches. To do the work properly, you want four or five men to a pair of horses. You will strike out as much land as you think you can manage in one forenoon, go round that piece with the plough, and have two men on one side of the land and two on the other, with potato-diggers, or forked hoes, and they will rake out the carrots each way. If the men are smart, they will just about keep up with the plough. You may work with your team until noon, digging out the carrots in that way. Mind you, a hand has not been touched to them yet. We will suppose this to be a dry day, as it should be, and those carrots have been drying on the surface of the ground all the forenoon. After dinner, have two teams, and four men will fill one cart while the fifth man takes a load to the barn cellar, and they will cart in the afternoon what they dug in the forenoon. By this method of harvesting carrots, you can accomplish twice as much as in the ordinary way. Any of you farmers who have had experience will admit that for one man to dig, top and get into the cellar a ton of carrots a day is a very smart day's work. By the method I have suggested, you will have two tons or more in the barn cellar for every man and horse that has been at work. There is a saving of one-half. You remember that it has been said that the man who makes two blades of grass grow where one has grown before, is a public benefactor. I want to ask you farmers if the man who will show you how to do two days' work in one in harvesting your roots, when you are expecting a freeze every day, is not a benefactor to you? I claim that he is.

Perhaps I may say a word with regard to the value of the carrot crop. You have all probably had experience in feeding carrots. I consider them very valuable for feeding to horses and cows. I do not say that they will increase the milk very much, but they will produce a first-rate quality of milk and a fair quantity, and keep the animals in a very healthy, sleek condition. The effect of carrots on the hair seems to be peculiar. They make the hair of animals very sleek. They are not only valuable as food for cattle and horses, but they are valuable to sell, and we want something to sell. With us, carrots will almost always sell. There seems to be a demand for all the carrots we can raise. We can sell them without sending them up here to Worcester, or to Vermont or New Hampshire. They will sell for from $8 to $12 a ton, which makes a very good business.

Question. What do you call a good yield to the acre?

Mr. Ware. With fairly good cultivation, you may expect from twenty-five to thirty-five tons to the acre. I have grown repeatedly more than thirty-five tons to the acre, reckoning thirty-six bushels to the ton. Thirty-six bushels of this variety will make a ton, while the long orange carrot requires forty bushels. Therefore, you get a ton in a smaller space. And this carrot, by the way, is a great improvement in quality over the long orange, which has been so long in the market. It is an excellent vegetable for family use,—tender, sweet, and fine. Perhaps the short-horn might be a little more desirable for that purpose, but we grow them mainly as a root crop for feeding purposes. But there is a constant demand for them in the market, to be sold by the barrel, for retailing purposes, and they bring for that purpose about two dollars a barrel, which is a very good price.

QUESTION. Where do you get the seed?

Mr. WARE. Grow it; then I know I have got seed that is good. And if any of you farmers want to get carrot-seed, send down to Marblehead for it.

QUESTION. Are they highly colored? There is a great call for carrots, especially where they make butter.

Mr. WARE. These are high colored, and are especially adapted to color the milk of Jersey cows.

QUESTION. You give them to the cows first?

Mr. WARE. Certainly. I will now touch upon the turnip crop. This is a second crop. We do not propose to grow it except as a second crop. If you have a piece of land from which a crop of potatoes, or pease, or any other crop, is taken early, plough that land, harrow it, drag it, sow your seed,—any time in August is early enough, generally,—and a good crop of turnips is secured. Be careful not to sow too much seed, because it is a great deal of work to thin them.

QUESTION. How do you sow your seed?

Mr. WARE. With the same machine, which can be adapted to any kind of seed. It has a revolving brush inside that will distribute seed of any kind and any size, through the different sizes of holes. You cannot sow parsnip or carrot seed, unless it is very nicely cleaned, with any other implement with certainty. This will do it with certainty. The turnip crop, as I said, is a second crop, and I consider it a valuable crop to grow as a second crop. The specimen I have here is the best variety. It is the purple-top, strap-leaf turnip. It grows a small top and large bottom. It is a clean root, sweet and delicate, and if grown quick, it is a delicious vegetable. I think it is valuable to feed to milch cows, and find it very satisfactory. You have heard it said, and probably will again, that the flat turnip is of no account; it is all water; it has no meat-producing or milk-producing quality. In reply to that, I will say that there is a man in my neighborhood who fattened a pair of oxen one winter by feeding them three bushels of flat turnips a day. He worked them every day; they never had a spoonful of meal, they were turned out to grass after the spring's work, and were so well fatted that they took the first premium at our Essex County Cattle Show for fat cattle. So that there is value in this turnip for feeding purposes.

The cultivation of the turnip is very simple. It requires thinning and weeding once, and at the same time, cutting through with the truckle hoe, and that is about all the attention that it requires before harvesting, which should be as late as weather will permit. You all know that turnips in the early part of the season are sweet and nice, but later in the season they become corky, and of little or no value as a vegetable. If I can tell you how to keep your turnips so that in the spring they will be just as sweet and free from corkiness as in the fall, I have no doubt you will be glad. The cause of this corkiness is the sprouting of the turnip. The moment it begins to sprout, it begins to grow corky, and in proportion as the sprout grows, the corkiness is more developed. In order to avoid that, cut off the top, so as to destroy the germs of the sprout, and cut off the root, so as to prevent any little rootlets from starting, and the turnip will keep just as fresh through the winter and along into the spring, as it was in the fall.

Question. How do you prevent their wilting in the cellar?

Mr. Ware. Keep them cool and do not allow them to dry up in the cellar; wilting is caused by drying. But if you have but a small quantity, throw something over them; a little seaweed, a few carrot-tops, or anything of that kind, or dry sand.

Question. Where do you get your seed?

Mr. Ware. Set out a turnip like this in the spring, and it will grow seed time enough to plant each year.

Mr. Dodge of Sutton. After four years, it loses its character entirely. Turnip and carrot seed should be imported every year, or certainly once in four years.

Mr. Ware. I beg to differ from you. This turnip has been grown in Marblehead more than a dozen years.

Mr. Dodge. I noticed that it was not a perfect turnip, as compared with those from imported seed.

Mr. Ware. Well, sir, if you can show me one more perfect than that, I would like to see it. That has grown from seed grown year after year in Marblehead, for more than twelve years. That turnip suits me very well. It seems to me good enough.

Now, with regard to the machine I use; Mr. Willis, who invented the machine from which I took this idea, is in the firm of Breck & Co., North Market Street, Boston. You will find Willis's seed-sower there, and the inventor is there now, I presume. They manufacture them, and they are the only parties who do.

Mr. ———. The question I wish to ask is, whether a brush-machine was not the only reliable machine.

Mr. Ware. I think it is. Other people may think differently. Perhaps gentlemen have not understood that the machine I use is a double machine, designed to sow the seed and fertilizer at the same time. They both drop into a hopper that tapers down like a tunnel, and the seed and fertilizer are delivered in the furrow together. Then it is provided with a little drag, that covers the seed, and presses the earth down upon it.

Question. Have you any trouble with the fertilizer killing the seed?

Mr. Ware. I would not use fertilizers that would injure the seed. I would not use Peruvian guano alone; I would adulterate it somewhat. Perhaps the guano you buy in a great many places would be adulterated enough; but the superphosphates that you buy, the Brighton fertilizer, and many other fertilizers, used in such small quantities as I apply, I think would be perfectly safe applied clear.

I will say one word in regard to the Swede turnip. It is a very valuable vegetable, and the very best crop I ever grew, and the best quality of vegetable, I sowed after a crop of early potatoes. It must have been as late as the 25th of July; but that is a little too late to sow it; ordinarily, it would not succeed sown as late as that. But I should not recommend sowing it as a first crop. The ground may be ploughed after the grass is cut in June, or after some early crop has been taken off, and this may be made to succeed well as a second crop. It is a very valuable vegetable for feeding purposes.

I do not grow it so much as I do the flat turnip and other roots, from the fact that it is a second crop, and my land is not usually at liberty quite early enough for the Swede, but it is at liberty early enough for the flat turnip. I think this is of as much value or more than the flat turnip, but it costs more to raise it, and I consider the flat turnip well worthy of cultivation for the cost that is incurred.

QUESTION. How much guano or phosphate would you sow with the carrot-seed?

MR. WARE. I cannot give you the exact amount of that as to weight, but I should regulate my seed-sower so as to distribute a small quantity of it. A person must use his judgment about that. I cannot give any specific rule to be followed. It would depend somewhat upon the strength of the fertilizer. If the fertilizer was very powerful, I should use less of it. But I would not use it very strong. If there was any danger of killing the seed, I would adulterate it somewhat.

QUESTION. Can you grow the turnip on old land, after other cultivation?

MR. WARE. Yes, sir; I always grow it on old land with perfect success.

QUESTION. How late can you sow the white turnip?

MR. WARE. I should say you might sow it any time up to the 20th of August. You would get a good growth, if the season was favorable; but if it should be dry and unfavorable, as it was this season, your turnips would not amount to much.

QUESTION. Would you sow them on the same land two years in succession?

MR. WARE. I should not recommend that.

QUESTION. Will the corn crop follow well a heavy crop of potatoes?

MR. WARE. I am not prepared to answer that question, from the fact that very little corn is raised at the present time in my neighborhood.

QUESTION. What is the best method of keeping the ruta-baga?

MR. WARE. It is important that the ruta-baga should not be harvested until near cold weather, or be put in too large piles. There seems to be a great deal of latent heat in them, and they will produce fermentation and heat quicker than, perhaps, any other vegetable; but if they are not put in too large piles, there is no trouble. I am careful, after harvesting my vegetables, to open the windows, on cold nights, and cool off the cellar as much as possible, not letting the roots freeze.

I came near forgetting the mangold-wurzel crop, which is an important one, and I will touch upon that, as, at the present time, I consider it a very valuable crop for farmers to raise. In the first place, we can get a very large product from an acre. There is no difficulty in getting fifty tons to the acre. There was a gentleman here this forenoon who has raised seventy-three tons to the acre, upon sea-kelp alone. But he had an advantage, that, perhaps, no other man will ever have, except in that particular location. He used sea-manure, kelp and such like, in abundance,—he had all he wanted, and the result was that enormous growth of seventy-three tons. I have grown, myself, and I feel very sure of growing, under favorable circumstances, fifty tons to the acre. There is no difficulty in that, but it requires good land, good manure, and plenty of it. I laid out for a crop of sixty tons to the acre this year, but did not get more than forty-five, owing to the very severe drought. Here is a specimen of the Norbiton red giant mangold-wurzel. I have already said that it is necessary to have plenty of manure to grow this vegetable. Perhaps it is unnecessary for me to say anything about sea-manure, because, I presume, hardly any of you have an opportunity to get it. But salt is good for this crop. Green cow-manure is good for this crop. Any strong, nitrogenous manure is valuable for this crop, as it is a gross feeder. My method of cultivation is in rows, twenty-two inches apart. I sow with the brush seed-sower. Four or five pounds of seed are required to the acre. It is a good plan to have seed enough. You may not all have observed, that the beet-seed, as we see it, is not the seed itself, but simply the hull, which contains two or three seeds; so that what appears to be one beet-seed is, really, two or three. Therefore, the crop must, of necessity, require thinning. They should not be thinned the first weeding, because sometimes the cut-worm will destroy a good many, and it is well to wait until the second weeding, when the plants have attained a little size. If the season is favorable, they grow very rapidly, and do not require more than two weedings. They soon cover the ground with their tops, and then there is no further trouble. This root is very sensitive to freezing, and should not be left out to be touched with frost. It is a good plan to pull them and wring the tops off. A knife should never be used in topping them, but the tops should be wrung off by hand, and the beets laid in a pile in the field. Cover them up with the tops a few days, to dry them a little, and then they may be put into the root-cellar. They keep remarkably well, and they are very valuable for feeding. I will tell you one fact in regard to mangolds, that, perhaps, many of you know. You may feed them, uncooked, to store-hogs, such as breeding-sows, etc., all winter long, giving them nothing else, and they will grow and thrive well, and be in good condition in the spring. I have myself, for years, given them nothing else, except the slops from the house. If you get fifty tons to the acre, or even if you do not get more than thirty, you are getting a vast amount of food from a little land. It is a crop, too, that will always sell readily in the market. We are selling them for from $10 to $13 a ton. They bring a better price than carrots, and do not require half the labor to raise them. It is a very valuable crop, but I do not think mangolds are worth $13 a ton to farmers to feed out, and when you can get that for them, you had better sell them. I suppose if you farmers should all go to raising them, I should not be able to sell any more. I would recommend green manure for this vegetable, but not for others.

QUESTION. How applied?

MR. WARE. Spread on and ploughed in.

DR. WAKEFIELD. How thick do you plant them?

MR. WARE. In rows, twenty-two inches apart, and leave them in the rows, when thinned out, eight or ten inches apart.

MR. CHEEVER. Don't you find it rather difficult to sow beet-seed with that brush seed-sower? It troubles me more than any other machine.

MR. WARE. Not at all. I will go on now to the cabbage crop. I hold in my hand a very good specimen of the Stone-Mason cabbage. It is not a large specimen, by any means;

it is small, but it shows the characteristics of the cabbage. It is, probably, the best cabbage that was ever introduced into this country, all things considered. Its origin was this: A paper of seed came from the patent-office, about forty years ago, to John M. Ives of Salem. He gave one paper of seed, among others, to John Mason of Marblehead, who planted the seed. There were, probably, a dozen varieties of cabbage-seed in that paper; but John Mason was a good farmer and a good judge of vegetables, and he was attracted to that cabbage, selected it, cultivated it for several years, and improved it by careful selection. Afterwards, John Stone of Marblehead went into the seed business, and he took this cabbage and improved it, perhaps, somewhat, and put it upon the market. It took the name of the Mason cabbage at first, from John Mason, and when Mr. Stone took it and put it upon the market, he gave it the name of the Stone-Mason. The only trouble with it is, it grows very solid, very hard, and if, at the season of the year when they are hardening up and ready for the market, the market is glutted, and we want to keep them back for a time, in order to get a better price, they will split open and spoil. Let me tell you how to prevent that. Go along and pull them up a little. That will stop their growth, and they will remain in that condition for perhaps two or three weeks, whereas they would spoil in three days, if not pulled in this way. I think that is an important piece of information, worthy of recollection. This has been raised more extensively, perhaps, than any other cabbage; but, of late years, there has been another cabbage introduced by Mr. Fotler of West Roxbury, who imported the seed about fifteen years ago from Germany. He kept it to himself for several years, but finally put the seed upon the market, at $16 an ounce. It is called the Fotler Early Drumhead Cabbage. As you see, it is a very handsome, showy cabbage. It shows for a little more than it is, while the Stone-Mason does not show for quite as much as it is. It is *taking*, it is *showy*, and, surprising as it may seem, it is taking the place, in Marblehead, of the Stone-Mason. And why? Simply because one shows for more than it is, and the other shows for less than it is. That seems to be the way of the world. But both of these are excellent cabbages. They are very sure to head, and they are, probably, the standard cabbages, and good enough. These two will supply the great demand for cabbages in the market, which demand comes from the foreign population mostly. But, for a Yankee, who wants a very nice and delicious article of cabbage, the Savoy is more desirable. This has been improved by the Marblehead farmers. You see, by this specimen, how small a stump it has, and what a solid, hard head. It is sure to head; just about as sure as the others, to which I have referred. It is a very desirable cabbage indeed. This will grow a great deal thicker than the others, because it does not grow as large.

The Hubbard squash. I must say a word with regard to the origin of that, because it claims its origin from Marblehead, and so do I. In 1848, Capt. John Bridges brought from the West Indies to Marblehead, two squashes. He cut one up, and gave a piece to William Stanley. That piece had some seeds in it. The quality being very choice, he planted the seeds, and the product was the Hubbard squash, from which have been derived the squash that we now call the Marblehead squash, and some other varieties. The Hubbard is now one of the standard squashes of the country. That is the kind that comes here from Michigan, and, as I told you, gluts the Boston market.

This is a specimen of the old Turban or "tea-kettle" squash, improved. We have taken a great deal of pains to improve it, and we have got it as near perfection as that. The quality is very superior. For early eating, it is the best squash. The Hubbard squash is the better for late in the season, commencing after December, usually. The Hubbard does not get its best quality until late in the season, while the Turban is excellent in quality when it is half grown, or nearly so, and continues to be first rate up to December, when it begins to lose its best qualities. So the two are admirably adapted, the one to follow the other.

The Marrow squash has been before the public for a long time, and I must say a word about its origin. Some forty years ago, John M. Ives of Salem received some half dozen squash seeds from some source, I know not what, and gave three of those seeds to Erastus Ware of Marblehead, who grew five squashes. He gave two of those squashes to Mr. James

Phillips, a near neighbor. Those two squashes yielded the seed which produced the first Marrow squashes that were ever introduced into Boston market. It has been changed from its original type. It is larger, and not quite so fine in quality, but it is admirably adapted to meet the wants of pie-makers, and they prefer it to any other variety. There is more of this squash sold, perhaps, than any other.

A word about the cultivation. The squash wants land such as we call good corn land, with manure spread on and ploughed in,—not very deep. After the ground is harrowed, mark it off with furrows eight feet apart each way; or you may drag a chain, if you please, to mark the rows, just eight feet apart, but it is necessary to have the rows true and straight; then throw a little night soil, that has been nicely worked up, or a little manure, or superphosphate, or something of that kind, in the hill, and mix thoroughly with a fork, and plant your seed. Instead of dropping the seed and covering them with the hoe, when I get the ground prepared, I stick the seeds in the hill, five in each hill. I am particular to put them in point down, because, if the ground becomes a little baked on the surface, it is sometimes very difficult for the seeds to come up. They have got to turn over before they can come up. I stick them down, therefore, the little bud first, so that they will start right, which makes a difference of three or four days in their coming up, and that is quite an important difference.

The squash has three enemies. One is the striped bug, which attacks it as soon as it comes up. The usual remedy for that is to take an empty tomato can, punch holes in the bottom, put in air-slacked lime, which is finely pulverized, and sprinkle it on the plants. It is very little trouble to provide against the striped bug. Then we have the large black bug, the one that does not smell good. Set a trap for these bugs by sticking a shingle in the ground at an acute angle at night; they will crawl under that shingle, and in the morning you can kill them and get rid of them in that way. Then there is the maggot, which enters the root of the vine, and will kill a single vine entirely. I know of no remedy; but by putting five seeds in a hill, if the maggot kills but one or two, there will be enough remaining.

Either of these squashes may produce about ten tons to the acre, which is a first-rate crop.

Question. What is your plan for keeping them through the winter?

Mr. Ware. We have squash houses for the purpose of keeping them, arranged with shelves inside, and provided with thorough ventilation, and means of keeping a fire most of the time, to keep a dry, even temperature all the time. We watch them closely, and just as soon as a squash begins to rot, it is taken out, because the fungus that makes the squash rot is producing spores continually, the air becomes impregnated with the seed of that rot, and it will permeate the whole house. You will smell it when the rot has just commenced. Hunt out the infected squash and remove it. The longer it remains in a room, the more the rot will spread. It is like an infectious disease. It is like the smut in an onion field. You must look out for the spores of the fungus which produce this rot. The way to preserve squashes is to keep an even, dry temperature, without much variation.

Question. What time do you plant?

Mr. Ware. The 15th of May is about as early as it is safe to plant, and they may be planted from that time up to the 10th of June.

Question. What is your opinion of the crookneck?

Mr. Ware. We do not grow that very much, from the fact that the demand is very limited. The crookneck is just as good as it ever was, but the new squashes are so much better, that there are few persons who care for the crookneck squash. I will say here, that the crookneck differs from the other varieties of which I have spoken, inasmuch as it does not send roots down from the stem into the earth to feed the squash, as the others do. In fact, it is a different species. The crookneck squash will not mix with these squashes; there is no family relation. They will not unite; but all these others will mix with each other, and also with the different varieties of pumpkins.

Mr. Moore. I desired to talk a little here this afternoon on the importance of procuring good seed, but it is so near car time, that there will be hardly any time for discussion. I feel bound to say this in regard to the machines that the gentlemen has spoken about: the seed-sower, for instance. If you are going to buy a seed-sower, look around before you buy that one. I have used it myself from the first, and it is a good seed-sower; but some three or four years ago, I said to a gentleman from Arlington,—and let me say here, that when I speak of the best market gardeners of Arlington, I speak of the best market gardeners of Massachusetts,—I said that Willis's seed-sower was the best. I really believed so, and I believe Mr. Ware believes so. But it is not so. I had to back down. There is a machine that will do the work better, and with less labor.

Then in regard to the wheel hoe. I said the same thing about the wheel hoe, and I had to back out of that. A gentleman made this remark to me when Mr. Ware was speaking of the wheel hoe, that it went out of fashion about the same time with pod augers.

Mr. Ware. Other garden hoes of different variety have been tried in our neighborhood, but no one will use them in preference to the truckle hoe. I have got half a dozen varieties.

Mr. Moore. You can sow larger seed with the one to which I refer than you can with Willis's, and do the work better.

Mr. Flint. I wish to say one word in regard to what Mr. Ware has called a "drag." I have no doubt that it is very valuable for the purpose he has described; but I have seen the machine used also as a substitute for a roller, and I took pains to make one. It is a good substitute for a roller, to use on a field after grass seed has been sown. I would not be without it on a farm. It is one of the cheapest and most useful implements on the farm, and will often save the expense of a roller, that a great many farmers cannot afford to buy.

Dr. Wakefield. Before leaving this hall, I think the Board ought to tender their thanks to the citizens of Worcester for the entertainment they have given the Board, and for the accommodation they have afforded us by this hall. I move that the thanks of the Board be tendered to the citizens of Worcester for their courtesy towards us.

This motion was carried unanimously, and the Board then adjourned, *sine die.*

ANNUAL REPORT OF THE CATTLE COMMISSIONERS.

To the Honorable the Senate and House of Representatives of the Commonwealth of Massachusetts.

The Commissioners on Contagious Diseases among Cattle, in making their Annual Report, have occasion to congratulate the people and stock-owners that during the year no contagious or prevalent disease has afflicted or decimated the herds of the State. Twice during the year application was made to the Commissioners to visit and examine herds which it was feared were sick with contagious pleuro-pneumonia; but the examination proved in one case to be ordinary pneumonia, and in the other a catarrhal difficulty, with a sympathetic affection of the lungs. Some loss resulted to the owners, but the alarm created by the report subsided after the visit of the Commissioners. The Legislature, by recommendation of the Commissioners, in 1876, passed an Act, with penalties for its infringement, forbidding all persons and corporations from driving or transporting into this State, Texas cattle, between the fifteenth day of May and the first day of November, unless such cattle had been kept north of the line of the Ohio River through one winter; and made it the duty of the Commissioners to carry out and enforce the provisions of the Act. In discharge of the duty required by the Act, the Commissioners, in May, caused the law to be published in a sufficient number of newspapers in the State to give it publicity, and sent circulars containing the same to the officers of such railroad corporations as engage to any extent in cattle transporation, and to many of the great cattle-dealers. At intervals during the warm season, one of the Commissioners visited our great cattle-marts to ascertain if the law was complied with, and though there were vague rumors that such was not the fact, yet no proof could be found of a single infringement. And it is believed that both transporters and dealers in cattle have in good faith complied with the provisions of the Act. As a result, the attention of the Commissioners has not been called to a single case of Spanish fever, and it is believed that such an one has not occurred. The expense of "carrying out and enforcing" the provisions of the Act, has been but forty-five dollars and thirty-five cents ($45.35). The last Legislature appropriated five hundred dollars to enable the Commissioners to discharge the needful duties of their office. Of this sum but about one-fifth has been expended, and it is hoped that the unexpended balance will be abundantly sufficient for the current year. Therefore no appropriation by the present Legislature will be required.

LEVI STOCKBRIDGE,
E. F. THAYER,
E. W. JORDAN,
Commissioners on Contagious Diseases among Cattle.

ANNUAL MEETING OF THE BOARD.

The Board met at the office of the Secretary, in Boston, on Tuesday, the 6th of February, 1877, at twelve o'clock, His Excellency, Governor RICE, in the chair.

Present: Messrs. Bagg, Baker, Bennett, Chadbourne, Davis, Dwight, Fenn, Goessmann, Hadwen, Hersey, Holland, Knox, Ladd, Loring, Macy, Merrill, Moore, Peirce, Perry, Phinney, Rice, Saltonstall, Sanderson, Shepley, Milo J. Smith, Stone, Vincent, Wakefield, L. P. Warner, W. L. Warner and Wilder.

Messrs. Wilder, Moore and Chadbourne were appointed a committee to consider and report on the order of business.

This committee subsequently submitted the following report:—

1. Reports of Delegates.
2. Report of Committee on the Agricultural College.
3. Report of the Committee of Arrangements on the Country Meeting at Worcester.

4. Report on Subjects assigned for Essays.
5. Miscellaneous and Unfinished Business.
6. Appointment of Delegates to Societies.

MARSHALL P. WILDER.
JOHN B. MOORE.
P. A. CHADBOURNE.

The Report was accepted, when, reports of delegates being in order, Mr. Baker reported upon the Essex Society; Mr. Saltonstall upon the Middlesex; Mr. Stone upon the Middlesex North; Mr. Peirce upon the Middlesex South; Mr. Macy upon the Worcester; Mr. Perry upon the Worcester West; Mr. Knowlton upon the Worcester North-West; Mr. Wakefield upon the Worcester South; Mr. Sanderson upon the Worcester South-East; Mr. Dwight upon the Hampshire, Franklin and Hampden; Mr. Hawes (read by the Secretary) upon the Hampshire; Mr. Shepley upon the Highland; Mr. L. P. Warner upon the Hampden East; Mr. Hadwen upon the Franklin; Mr. Holland upon the Deerfield Valley; Mr. W. L. Warner upon the Berkshire; Mr. Chadbourne upon the Housatonic; Mr. Stone upon the Norfolk; Mr. Vincent upon the Bristol; Mr. Smith upon the Plymouth; Mr. Phinney upon the Hingham; Mr. Fenn upon the Barnstable; Mr. Merrill upon the Nantucket; and Mr. Knox upon the Martha's Vineyard.

A committee of three, consisting of Messrs. Moore, Hadwen and Macy, was appointed to consider and report upon the time and place for holding the next country meeting.

The Committee on Credentials was constituted by the appointment of Messrs. Phinney, Wakefield and Fenn.

Mr. DWIGHT presented and read an essay upon the—

SIZE AND CONDUCT OF FARMS IN MASSACHUSETTS.

What I may have to say is from my own experience and observation. The proper size of farms in Massachusetts depends very much on the location, and so does their management. For instance, a farm of a few acres near a city, town, or a large manufacturing village, where there is a ready market for every kind of garden vegetable, would be sufficient, and at the same time do a large business.

At an agricultural meeting a short time since, I heard a gentleman say that he sold from his farm of about thirty-five acres, some $13,000 worth of produce annually; and another gentleman remarked that he sold from seventeen acres, from $5,000 to $7,000 worth annually. Their farming was in the line of market-gardening, and this requires a great deal of labor and high cultivation.

Some have advanced the idea that ten acres is all that any one ought to cultivate, and "ten acres enough" has been a popular cry. In this case, every foot of land is turned to account, and large incomes are realized; garden vegetables and the small fruits are cultivated, and placed in the market early and fresh. But not having any practical knowledge of this particular branch of farming, I shall not enlarge on this point.

On the other hand, I have seen farmers, more distant from market, upon farms of fifty acres and apparently pleasantly situated, keeping two cows and a horse, getting a comfortable living with little expense, and not much income. Others, more distant from market, have one, two, three, and some five hundred acres, and a few still more than that, with cattle counted by scores and sheep by hundreds grazing thereon, some for the dairy and some for the shambles, at all seasons of the year.

On such farms ten, or even twenty, acres of corn, rye, oats, barley, and potatoes, in rotation, with hard labor, will return a fair income.

The hay-fields, in some cases ten acres in extent, in some fifty, and in others even one hundred acres in area, yield usually one crop, sometimes two, which afford enough hay for home consumption, and a surplus for the stable-men, miles away.

A farm of two hundred acres (without a mortgage), back in the country among the hills and valleys, with good farm-buildings, located near a small village, churches, school-houses, post-office, stores, and situated not very far from a railroad station, is the most desirable of all places for a growing family, and is a convenient size for proper management. Such a farm, if conducted on good, practical, scientific principles, can be made profitable,—and it is to such farms that the sons of our Massachusetts farmers will cling, if properly encouraged. A thorough and high cultivation of our lands is at the present time most desirable. A farm of two hundred acres may be equally divided into mowing, tillage, pasture, and woodland. It will be very convenient to clear about one acre of woodland every winter; in so doing one will have plenty of fuel, and lumber for repairing buildings, and a few cords of wood for the market.

The fifty acres of mowing should furnish one hundred tons of hay, and this, with the corn-fodder and straw the farmer will also have, will keep fifty head of cattle at least six months in the year. The fifty acres of pasture will keep the cows and young cattle the other six months. The fifty acres of tillage will, if well cultivated, furnish all the corn, rye, oats, barley, potatoes, and beans that would be needed for home consumption; and every farmer should raise all the grain and potatoes that he needs, and have a good surplus for the market. When corn can be raised for forty or fifty cents per bushel in Massachusetts, we need not depend on the West.

Every farmer should be careful in selecting his live-stock. First, he should select those breeds adapted to his locality; and, second, those particularly adapted to his wants. If for cheese or milk for the market, choose Durhams or Ayrshires. If for butter, Jerseys or Devons would be the favored ones.

Sheep and swine, of the best breeds, should be reckoned with the stock.

A pair of horses and yoke of oxen are always needed on a farm of this size.

The three essential things in Massachusetts agriculture, in all its varieties of the field and the garden, are quality of production, quantity of crops, and economy of culture. Our proficiency in these particulars measures our ability to compete with rival producers West and North.

Next to hay, the corn crop is of the most value to the farmer, where the chief product is milk. Moreover, the annual product of hay will be greatly increased, if the cultivation of corn is pursued; for it may safely be said that no other crop which does not require higher treatment and better tillage, so well prepares land for grass.

The treatment of mowing land varies. Dry hill land, sandy soil, needs ploughing often, while moist, heavy, black loam, with an occasional top-dressing, will hold good for years.

Another point is this: Keep the cattle from the mowing-field, and let the aftermath remain to protect the grass-roots during winter, and, as a general thing, the sward will hold its own. On the other hand, if the fields are grazed, give them a top-dressing every year.

If twenty cows are kept, as there should be, and $75 profit from each is realized, there will be an income of $1,500 from the cows alone; some claim to realize $100 profit per cow, and others still more.

Twenty fat hogs and ten veal calves sold, will add about $600 more to the income from the farm; and twenty pigs should be raised and sold, adding at least $100 more.

Ten beef cattle sold will make $500 more; meanwhile ten calves should be raised to replace those sent to the butcher annually.

When the sheep are clipped and the lambs sold, at least $200 should be realized from them; and all these, together with the poultry and eggs sold, will easily bring up the total income from the farm to the sum of $3,000.

These few items I have named are comparatively few to what might be given.

Two hired men will be required to carry out this plan,—one for the year, the other for eight months,—and they will cost about $500; and a servant girl $200 more. With all this theory, the proprietor must have a clear head and a practical hand to engineer.

Every farmer should be careful of the wastes of the farm; all the manure, both solid and liquid, should be collected in the barn-cellar for composting. The droppings from the hen-roost, *most valuable of all*, with the privy, should have a fresh supply of earth often. The sink-drain should be carefully scraped out to replenish the compost heap; the wood-yard cleared up, the wash from the road-side, and leaves from the grove, all should be saved. Finally, everything of a fertilizing character should be economized and composted in the barn-cellar. This will furnish a supply for top-dressing ready at all seasons of the year.

Another source of income is the apple, pear and peach orchard, which requires close attention and careful treatment. Pigs may run in the orchard during the fall, when they can obtain their own living from the fruit that falls. The pigs will keep the soil loose around the trees, and destroy the grubs and worms that infest an orchard.

Farmers, to avoid the expense of too much hired labor, should avail themselves of all needful improved agricultural implements to expedite their work, not only in the hay-fields, but in the corn-fields, and in the cultivation of the root crops. If the land is not already cleared of stones and rocks it should be done at once, so that the machines will work in every corner.

DANIEL DWIGHT.

The essay led to discussion, in which Messrs. Chadbourne, Smith and others participated, when it was laid over.

Professor GOESSMANN then presented his Third Annual Report—

ON THE IMPROVEMENT OF SALT-MARSHES.

The recent progress in the cultivation of the reclaimed salt-marshes in the town of Marshfield, has been, on the whole, quite encouraging, in spite of an unfavorable season. The dike has done its business thoroughly during the past year, and is in good condition. The water in the river has stood, most of the time, from five to six feet below the surface of the meadows, and has risen only in exceptional cases—after freshets and heavy rainfalls—to within two feet of the latter. No general system of drainage has yet been adopted, and but little has been done during the past season in regard to a more extensive draining, beyond the clearing out and the deepening of old ditches. The character of the spontaneous vegetation has, for this reason, varied but little, in many localities, from that noticed during the preceding year.

The unusual drought of last summer caused a more extensive destruction of the indigenous, worthless surface-growth, by lowering the level of the subsoil water, and thereby increasing the chances of a more rapid decay of the accumulated vegetable matter, which serves still, generally, as the main support of the former. Although various grasses made their appearance spontaneously here and there, to a limited extent, a dense vegetation of everlasting (*Gnaphalium polycephalum*, Mich.), and other upland plants, as a general rule, continue to spread rapidly over an extensive area of the reclaimed marsh-meadows. A large proportion of the latter, which had been sown to grass in previous years,—by sowing the seed merely upon the original sward, which had for several seasons produced a most excellent crop,—succumbed to the late drought, and proved a total failure; a small portion of them only yielded good, stout grass.

Wherever the lands had been drained, either along the river, by natural advantages, or by ditches, with outlets towards the latter, the grass lands have produced, as a general rule, remarkably well, provided the surface portion of the soil remained compact; whilst in those cases where the immediate support of the old sod has acquired a spongy condition, the late severe drought has not only destroyed the expected grass crop, but also largely killed the roots. It seems but reasonable to assume, that the winter frost will operate in the same direction, and thus increase the serious effects of the late drought. Results like these will attain, from year to year, larger proportions, until the soil, in consequence of ploughing and harrowing, shall have become sufficiently homogeneous and compact to start, not only a vigorous grass growth, but to protect it also more efficiently against the extremes of the seasons. A compact soil, in a good mechanical condition, aside from an efficient drainage, is one of the essential requirements for the development of a healthy, dense sod.

All the grass thus far grown upon the marshes has been raised, either by sowing the seeds without any previous preparation directly upon the old sod, or, in more exceptional cases, after harrowing merely the latter, before seeding. Since the construction of the dike, several hundred acres have been cultivated for grass in that manner. In the majority of cases, as stated above, the crops have soon failed to be satisfactory, either on account of a deficient drainage, or in consequence of a rapid disintegration of the organic matter below the surface, and subsequent breaking up of the original sward,—a change which the severe drought of the present and previous years has generally favored. Most lands which have yielded thus far, annually, good returns, are liable, for similar reasons, to fail at any time.

The best results with grass have been obtained with "red-top" seed (*Agrostis vulgaris*, With.), although "herdsgrass" (*Phleum pratense*, L.) has been sown to some extent. A measured acre of "red-top," grown upon harrowed land, produced during the late season nearly three tons of hay. Sixteen rods of land, sown three years since, yielded during the past summer at the rate of over three tons and a half; the grass was three feet high when cut. These returns may not be superior to those in other cases; they are stated in detail, because pains had been taken to ascertain exact figures. Mr. Thomas B. Williams of Boston raised about twenty tons of good English hay; other parties have harvested from one to fifteen tons. The entire hay crop in the marshes has, the past year, amounted to fifty tons of English hay.

Very little of the *ploughed land* has yet been sown to grass. A lot of about one acre, ploughed and harrowed thoroughly, which was sown during the past year, looked remarkably green and well before the snow covered it. This is the first attempt in that direction. In the last report it has been stated that Mr. Williams and others had ploughed during the autumn of 1875 about fifty acres of the former marshes, and proposed to use them for the cultivation of grain. Some of that land was sown at once to grain, the larger portion had been reserved for the past spring to be used mainly for oats. Rye, oats and garden vegetables are the main crops upon the ploughed lands, and the results have been, on the whole, very encouraging. Mr. Williams raised one hundred and eighty bushels of rye, three hundred and fifty bushels of oats, besides some wheat; Mr. Edward White raised about fifty bushels of oats. An island in the river, about one-half an acre in size, has proved a very profitable garden in the production of melons, squashes, cucumbers, beets, potatoes, corn, beans, pease, etc. No fertilizers of any description have been, thus far, applied. The rye and oats were, at the close of July, in every respect equal to the best upland grown grain, although some of the former had been sown so late in autumn that it did not show itself until spring. The oats were largely sown upon lands after the first ploughing, where the turf was too tough still to pulverize to any extent when harrowed. The surface was thus very much broken up, and quite unsuited for a uniform growth. The rye, at the time of cutting, stood between five to six feet on a level, with specimens six and a half high and bearing well filled heads, seven inches long. The oats were three and a half feet on a level. A suggestion of Professor Henry Mitchell of the United States Coast Survey, to send a collection of these crops to the Centennial Exhibition, where they would compare well, in his opinion, with those raised upon the rich Western prairies, failed to be acted upon, on account of some oversight in the packing of the samples collected for that purpose; they did not leave Boston, being found in a damaged condition. Responsible parties state that an acre of rye has produced, on an average, thirty-four bushels of grain and five thousand four hundred and fifty-four pounds of straw; one acre of oats, on an average, forty bushels. The bushel of rye sold at eighty cents, the bushel of oats at fifty cents; the ton of rye-straw and the ton of hay each at twenty dollars. The gross receipts of the produce of one acre of rye, as above specified, are as follows:—

34 bushels of rye, at 80 cents per bushel,	$27 20
5,454 pounds of rye-straw, at $20 per ton,	54 45
Total,	$81 65

The average cost of ploughing per acre has been ten dollars, and for harrowing, five dollars. The "Holbrook Swivel" plough is generally used, requiring two yoke of oxen for working. Ditches two feet wide at the top and four feet deep, have cost about seventy-five cents per rod.

The late success has evidently stimulated the enterprise. Over one hundred and fifty acres of the reclaimed marsh lands have been ploughed during the past season by the following parties: Thomas B. Williams of Boston; Th. P. Ford, Edward White, Stephen Henry, M. Goodhue and others of Marshfield. About fifty acres of these were sown to rye during the late autumn, and the balance will be largely sown to oats during the coming spring. The fact, that of late but a few changes in the ownership of the reclaimed marsh lands are recorded, may also be considered a favorable indication of an increasing confidence, on the part of the present proprietors, in the ultimate pecuniary advantages of the investment.

I have taken pains, during a visit to the marshes, in the month of August, 1876, to inquire into the character of the soil and of the subsoil water, in localities remarkable for their barrenness in the midst of a vigorous and valuable vegetation.

I. A sample of soil taken from a field but six to eight rods from the main river, in the middle of the marshes, upon which oats had failed during the last year, contained, in its dried state, 6.50 per cent. of chlorine, which is equal to 10.73 per cent. of chloride of sodium or common salt.

II. Water taken from an isolated ditch, about four feet deep, and from twelve to sixteen rods distant from the main river, contained 1.84 per cent. of chlorine, which is equal to 3.034 per cent. of chloride of sodium or common salt.

III. Water taken from a main branch of the river, in the middle of the marshes, near the localities where samples Nos. I. and II. had been secured, contained but 0.23 per cent. of chlorine, which is equal to 0.35 per cent. of chloride of sodium or common salt.

These results demonstrate quite conclusively that deficient drainage, even in the vicinity of the river, remains still, in many instances, the main cause of failures of valuable crops. Coöperative arrangements among the present owners of the marshes become, from year to year, more desirable in the interest of the highest attainable pecuniary success. All attempts at introducing a rational system of tillage will fail in the same degree, as an efficient drainage shall be neglected. United action on a well digested plan, suitable for the entire area of the reclaimed lands, would not only bring speedy success to all parties interested, and thereby secure better chances of a fair interest on the investment to all concerned, but also greatly reduce the actual expenses for the work ultimately required of all. Those whose property is located along the river and its various branches, ought to lead in the enterprise.

As long as more detailed examinations regarding the level of the meadows, the character of the soil, and the general condition of both, do not reveal circumstances which are varying from the present information, it seems but proper that the Green Harbor River, with its extensive ramifications, should be converted into the common receiver of the drainage waters of the entire marshes. The periodical rise and fall of the level of the river would favor, in an unusual degree, the diluting and final replacing of the strong saline subsoil water. The main drain ditches should, for obvious reasons, start from the river, and branch off in continuous lines to the interior termination of the marshes; for ditches without any outlet to the river can be of but little benefit, except they occupy a large area, and even then can only partly perform the work needed. Many of the old and isolated ditches might, after some cleaning out, be made serviceable as links or parts in a more general system of draining. In case an attempt to introduce a general plan should be delayed, or fail entirely, decidedly better results might be secured from a comparatively large area in the vicinity of the river by connecting many of the already existing old ditches with the river, and thereby opening outlets for injurious, strong saline solutions, similar to that described above as sample II. In many instances, where indications are of local obstructions in surface-drainage, due to intervening, impervious layers of clayey deposits, much benefit might be secured by cutting simply through the soil-mass to a depth of from four to five feet, and subsequently filling up the excavation with coarse materials, stones, etc. The existence of such condition of the tidal-water deposits within the marshes, and their serious effect on the vegetation, has been discussed already in detail in a previous report.

The late success upon the drained and ploughed lands is a substantial indorsement of our previous advice to use the plough effectually as soon as the soil fails to produce a good grass crop in consequence of a breaking down of its sod.

Some of the most enterprising, and at the same time most successful, local managers of the marshes, concede the correctness of our opinion, that the unusual exposure of the grass-roots is the main cause of a reappearance of a worthless growth in places where for a few years past valuable crops had been secured. An early ploughing of these tracts can but bring about a more reliable condition for future cultivation, by converting the differently composed surface-layers of the marshes into a more homogeneous agricultural soil; a judicious management will find in the material obtained, in consequence of the construction of drain-ditches, a valuable resource for the improvement of that portion of land which is still overcharged with partly decomposed, coarse vegetable matter. In addition to rye and oats as first crops, it might be well to try barley and buckwheat instead of wheat, for a raw and still saline soil is more congenial to the former than to the latter. As soon as the soil is more capable of a thorough pulverization, a mixture of valuable grasses ought to be thoroughly tried.* They would produce a more compact and vigorous sod, if selected with reference to their peculiar growth and a uniform period of maturing. It will also be advisable, for a few years to come, to select the crops with a view to improving the mechanical condition of the soil; beets and potatoes are known to yield well in soils like that in drained marshes. As the accumulated organic matter, in its various stages of disintegration, must necessarily continue to alter the chemical and physical condition and thus the general character of the soil for some years, it needs scarcely to be mentioned, that in each case the exact condition of its soil ought to be carefully consulted in the selection of crops. A due appreciation of these circumstances renders it inadvisable to advocate, in the present stage of the enterprise, a more definite system of cultivation,—beyond the general remark, that the selection of the rotation of crops ought to be made, not only with a view to economize the latent plant-food, but to aim also at the preservation of a liberal amount of organic matter in the soil, which will secure to it good retentive qualities.

CH. A. GOESSMANN.
S. B. PHINNEY.
GEO. M. BAKER.

---

* The following mixture of grass-seeds is highly recommended for conditions of soil like the one here under discussion: Per acre, a mixture of nine pounds of meadow fescue and six pounds of June or Kentucky blue-grass; six pounds of orchard-grass; six pounds of tall oat-grass; six pounds of meadow soft-grass; three pounds of tall fescue; three pounds of crested dog's-tail-grass; one and a half pounds of timothy or herdsgrass; one and a half pounds of yellow oat-grass.

The essay was read and laid over, under the rule, to come up for a second reading, when the Board

Adjourned.

SECOND DAY.

The Board met at ten o'clock, A. M., Hon. MARSHALL P. WILDER in the chair.

Present: Messrs. Bagg, Baker, Bennett, Burnap, Chadbourne, Comins, Davis, Fenn, Goessmann, Hadwen, Hersey, Holland, Johnson, Knowlton, Knox, Lewis, Loring, Macy, Merrill, Perry, Phinney, Saltonstall, Shepley, Arthur A. Smith, Metcalf J. Smith, Milo J. Smith, Upham, Vincent, Wakefield and Wilder.

The Committee on Credentials presented the following

REPORT:

The Committee appointed to examine the credentials of newly elected members, have attended to that duty, and respectfully report that the following are duly elected: By the—

Massachusetts,	CHARLES S. SARGENT.
Middlesex North,	JAMES T. BURNAP.
Worcester North-West,	ENOCH T. LEWIS.
Worcester South,	NATHANIEL UPHAM.
Hampshire,	HENRY C. COMINS.
Union,	FRANKLIN C. KNOX.
Franklin,	ARTHUR A. SMITH.
Hoosac Valley,	WILLIAM E. JOHNSON.
Norfolk,	HENRY S. RUSSELL.
Hingham,	EDMUND HERSEY.
Barnstable County,	S. B. PHINNEY.
Martha's Vineyard,	HEBRON VINCENT.
Appointed by the Governor and Council,	Hon. MARSHALL P. WILDER.

S. B. PHINNEY,
HORACE P. WAKEFIELD,
D. B. FENN,
Committee.

The report was accepted.

The Committee to consider and report upon the assignment of Delegates was constituted by the appointment of Messrs. Knox, Phinney and Shepley.

The Committee to consider and report a List of Subjects for Investigation was constituted by the appointment of Messrs. Chadbourne, Loring and Fenn.

The Committee to nominate two members of the Standing Committee on the Examination of the Agricultural College was constituted by the appointment of Messrs. Hadwen, Knowlton and Baker.

Mr. SMITH of Middlefield then presented a report as delegate to the Marshfield Society; Mr. MOORE reported upon the Hampden, and Mr. BAGG upon the Bristol Central.

Mr. HADWEN made a verbal report as Chairman of the Committee of Arrangements for the public meeting at Worcester, a written report to be submitted before the close of the session.

Voted, That hereafter the Committee on Meetings be requested to submit a report in writing at the annual meeting.

Mr. HADWEN then submitted and read an Essay upon

THE IMPORTANCE OF ARBORICULTURE TO THE AGRICULTURAL COMMUNITY.

It would seem almost superfluous to add anything to the elaborate essay of last year. But if it is the mission of this Board to foresee the wants of generations to come, and to educate the public taste in the direction of tree-culture, we ought to add "line upon line." With the progress of civilization forests are rapidly disappearing, and ultimately few will be preserved, except those receiving the fostering care of man.

The early and pioneer settler found it necessary to cut away a portion of the original forests to obtain land for the growth of crops to sustain his family and stock, and after having obtained a sufficient area, the remaining forests were, as a rule, scrupulously cared for; but succeeding generations found the forests of great pecuniary value, and they were cut away as if they were the product of a season instead of centuries. The result is that thousands of acres of lands that were once covered with forest trees, are now comparatively unproductive.

We have many acres that never have produced, and, in the nature of their situation, never can produce, any crop but forest trees, that will return any profit to their owners.

Trees that are indigenous to the soil and climate of the State, are so abundant, and some kinds introduced from foreign countries grow and thrive so well, that there seems to be nothing but encouragement for owners of waste lands to plant trees.

An abundant supply of forest trees is essential to the prosperity and wealth of every civilized community. The forests have contributed more material for the rapid construction of buildings, both in country and town, than was ever obtained from other sources. Our productive industries are so largely dependent upon wood in their large and varied manufactures, that its scarcity should be guarded against, and the supply made equal to the demand.

The home supply is not now, nor has it been for many years, equal to the amount annually used in the State. We obtain our lumber, of almost every description, from distant forests, and they are yearly growing more distant, and the lumber more costly, owing to expensive freights, which are the legitimate result of long transportation.

Nature seems to have wisely intended and adapted trees and soils for the best results, but trees often grow and thrive in soil naturally most congenial to their growth; there is comparatively a very small area of land in the State upon which some of the forest trees will not thrive.

The time has come when the price of lumber will justify the planting of forest trees as a legitimate and profitable business. On many lands in the State trees spring up spontaneously, and on rich lands their growth is very rapid; but upon the poorer lands artificial means for the propagation of forests should be used. Our useful forest trees have seldom received the care which is given to fruit trees, and have seldom been subjected to any great change from their natural condition and growth. They rarely receive, outside of the nursery, either in forests or grounds, artificial manuring for the purpose of stimulating rapid growth and early maturity. They are, however, equally benefited by liberal cultivation, as are other crops, and amply repay by rapid growth. It has been found that forest trees, when planted under the most favorable circumstances, will attain double the height and diameter of trunk in a few years of those uncared for.

It will require time to induce owners of land to plant trees for the benefit of future generations; but no farmer can afford to hold unproductive lands, subject to annual taxation, and although the growth will not pay the owner a semi-annual dividend, still, if forest trees are cared for as other crops, the annual growth for a term of years will return a larger per cent. than do many of the lands now used for farming purposes.

There are but few soils in which some of the many kinds of trees indigenous to our climate will not grow and thrive. In some portions of the State forest trees have been extensively planted, and have grown with profitable results on lands that were comparatively unproductive, and many individuals have lived to gather the harvest who little expected to do so at the time the trees were planted.

From boyhood we have been interested in the planting and cultivation of trees; they have added to our enjoyment for the past forty years more than any other branch of agriculture. They are always present, and in their variety some are enjoyable every day throughout the year.

Each variety of trees has its distinct symmetry and shape, and the wood of each is especially adapted to some important use. For timber to be used for building purposes, the chestnut, spruce, larch and hemlock are good; the larch, perhaps, growing most rapidly.

The oak, ash, walnut, elm and bass are used largely in the manufacture of carts, wagons and carriages; the pines furnish the best plank and boards; cedar is extensively used for shingles; while the maples, butternut and black walnut are adapted to the use of the cabinet-maker and inside finish of our buildings.

All of these grow and thrive in the climate and soil of the State, and will repay well for cultivation, as the days of cheap lumber have passed and cannot return, at least for many generations. The above-named trees may be designated as those most easily grown, and they are most prominent as contributing largely to our general use. They are cheaply and readily grown from seed, but it requires experience to obtain the best results.

The soil to be used for growing should be finely prepared and well enriched as if for garden purposes; and the seed may be planted in beds or in long rows, where grown largely, and so that horse labor may be used in their cultivation. The seed and nuts of trees may be planted as they come to maturity. When nuts are to be used for planting they should not be permitted to become dried, but should be placed in the ground immediately after being gathered.

The seed of the pines, spruce and larch should be planted where the young plants can receive shelter from the sun's rays during the early stages of growth. They seem to flourish in the shade and under a moderate degree of temperature. In fact, the sun's rays will destroy nearly all of the young plants, if allowed to shine upon them with full power. As a protection, cotton cloth affords a cheap and effectual shade for seedlings, and is very largely used by nursery-men whose specialty is growing evergreens for forests and ornamental purposes.

The seeds of the elm, walnut, oak, ash, maple, beech, and chestnut are usually planted in beds, and they should be transplanted annually during the first three years of growth. These trees are more hardy, and resist the sun's rays better than the evergreens, and require but little shelter in the early stages of growth.

The transplanting of both deciduous and evergreen trees, when young, is of the utmost importance; it causes their roots to grow more fibrous, thereby lessening the risk of transplanting when they are of larger growth, as well as increasing the rapidity of growth, for the first few years. As the roots and tops are dependent the one upon the other, both should receive the same care. Trees may be planted at all ages; small trees, however, are the better, being more rapidly and easily handled. Large trees can be successfully transplanted where the immediate embellishment of grounds demands, but the expense is very largely increased.

It would be impossible to name fixed rules for planting trees, when the work is to be done under varying circumstances; practical experience is alone reliable. Ordinarily speaking, large holes in proportion to the size of the trees should be dug, with a mound of earth raised in the centre of the hole for the tree to rest upon; the roots should be arranged so that they may fit the hole and maintain their natural position and tendency, and the tree will stand alone before any support is given it. It is always expedient to prune the roots with a sharp knife immediately before planting. Good, fine soil should be thoroughly and firmly incorporated among the roots, and, if the soil is friable, it may be pressed about the roots; if wet, no pressure should be used.

If the trees are large and require separating, hooked stakes may be driven into the ground, the hooks holding the largest roots in their places; if large stones are at hand they may be placed on the surface of the ground around the tree until the roots grow into the soil.

In transplanting the larch, great care is absolutely necessary to ensure success. For transplanting large trees we recommend the autumn, as the roots will not bear exposure to the sun or weather. If planted in the spring it should be done as soon as the frost is out of the ground; a few warm days bring the larch too forward to plant. If the larches live and grow the first year, we have never known them to die afterwards. In our experience no other tree is more likely to do well and make rapid growth, if successfully planted. We regard the European larch as one of the best trees to be grown for timber, and it is very desirable as an ornamental tree, coming next to an evergreen for shelter, its habit of growth being like many of the evergreens. The larch affords the best shelter for orchards, and grows freely in all soils.

Evergreens, as a rule, like a deep, moist loam, and should be planted with balls of earth adhering to the roots, if possible. Their roots will not bear exposure to the sun or air. Cloudy weather is the best time to plant them. Aside from their great value for timber, they are indispensable for sheltering our habitations from bleak winds, and they are objects of beauty the year round. The best of the evergreens for timber and ornamental purposes are the pines,—the white, yellow, Weymouth, Austrian, Scotch, Cembra, all these are hardy. The Norway, white and hemlock are the most desirable spruces, and each and all are valuable.

A very important point in tree-culture is pruning. This, if judiciously done, assists trees to early development, and proves a remedy against the large knots so often found in lumber. General rules can be applied, each to produce certain results. The force of growth in young trees should be given to the leading shoot, and strong side branches should be removed in trees designed for timber, but are generally allowed to remain on trees for ornamental use. In pruning evergreens, the limbs should be cut a few inches from the trunk, and on the next year, they may be knocked off.

In taking the measure of the circumference of some of the trees planted by our own hands twenty and twenty-five years ago, which have been growing in belts and under nearly the same circumstances as far as soil, care and cultivation have contributed to their growth, we are surprised at the comparatively slight difference in their girth. The results of their measure is as follows: Elm, five feet four inches; Norway spruce, five feet three inches; bass, five feet two inches; white pine, four feet six inches; sugar maple, four feet five inches; oak, four feet three inches; European larch, three feet ten inches; shellbark walnut, three feet nine inches; and there is but a little difference in their height, averaging forty-eight feet. In estimating the feet of lumber in our trees now growing in belts, which were mostly transplanted from pastures, solely for the purpose of affording shelter and embellishment, we find that we have now growing more feet of lumber than would be required to replace our farm buildings if they were destroyed by fire. Fully realizing the comfort we derive from their shelter, we doubt if we could have the fortitude to cut our trees for timber, unless the want were imperative, although the timber has been cheaply and easily grown.

We consider our trees absolutely necessary, too, in embellishing and sheltering our habitation, the orchard, the crops, and the herds, as well as lending a charm to the landscape and shade to the wayfarer. Belts of trees should be planted on the outskirts of the farms, and the fields and orchards, to screen from view unsightly places, and waste spots, however small, should have trees growing on them.

Trees growing in belts are less liable to be injured by fire, especially in the vicinity of cities, towns and railroads, than trees occupying larger areas.

The absence of coal-beds in the State, the necessity of a supply liable to occur from various causes, and the immense amount of fuel annually consumed, admonish all to be well prepared for any and all contingencies that are liable to arise. Wood, from the nature of our situation, must be largely used as fuel; and, although the area of woodlands is yearly increasing, still the time is coming when it will all be wanted, at remunerative prices. In fact, from the outlook at present, it would seem that forest-tree planting is well worthy the earnest consideration of the capitalist and all owners of unproductive lands; and may we all hope that the intelligence of those who, having the facilities, will speedily adopt tree planting as one of the necessities for the future prosperity of the State. O. B. HADWEN.

The Essay led to a lengthy discussion, in which Messrs. LORING, SHEPLEY, MOORE and others participated, when it was laid over for consideration.

Voted, That the Committee appointed at the last annual meeting to confer with the committee of the Legislature in reference to the reclamation of salt-marshes, be continued.

Voted, That a committee of three be appointed to hear and consider any requests for changes in the times of holding fairs. Messrs. Wakefield, Hersey and Davis.

Pres. CHADBOURNE then presented and read an Essay upon—

BUDS.

When the subject of "Buds" was first assigned for an essay, President Clark was named as chairman of the committee, and it was understood that he would be able to carry out certain experiments to settle questions suggested by himself and other members of the committee. As he has been called to such work as has prevented these investigations, I propose to present a few thoughts at this time, and make some suggestions to direct our observations and experiments, if we are unable to give any time to experimenting.

Buds are a provision of nature for the production of new individuals.

In the tree we regard them as a provision for branching. But every branch is a new individual, which draws its nutriment from the parent stock instead of from the earth by its own individual roots, so that every tree, which we often regard as one individual, is an aggregate of individuals, its trunk and root being the joint product of all the leaves and branches it has ever borne, itself being at any one time an aggregate of as many individuals as it has living buds upon it. The trunk of the tree is like our federal Union ; its branches like the States. The tree is one, not as an individual, but as our country is one.

The bud, we have said, is a provision of nature for a new individual. The fact of reproduction by buds and seeds we know, but we know nothing of its cause. Every bud originates from a cell and from a cell in a particular place or under peculiar conditions, and each plant is subject to a mathematical law according to which all its buds appear. But why all trees of one species place their buds according to one law and all the trees of another species adhere rigidly to another law, no man can tell, probably no man ever will tell.

The leaf-bud, so called, develops into a branch, and, as is well known, can be transplanted into other kindred trees, for budding and grafting are simply the transplanting of buds and grafts into trees where nutriment is already elaborated for them, rather than the transplanting of them into soil where they must elaborate for themselves, if they live at all. Other buds we call flower-buds. They develop two distinct kinds of organs, and the great mystery of sex is manifested here,—a wonderful provision that seems to appear in some form, not only among the lowest animals, but among plants also. We have learned under what conditions flower-buds will form, and that is all we know. There is a law here so deep that we cannot fathom it, but it is well to note the facts.

When a tree is able to take and prepare more food than it can readily use in forming wood, it uses this surplus in making fruit—young apple-trees that are about to die from injury to the trunk or roots are apt to spend what little strength they have in producing blossoms and fruit, and I notice now, as our beautiful maples are dying from the action of the borers, that the year before they die they are perfectly loaded with fruit. The fact seems to be that all organisms are so constituted that when they must soon pass away by natural causes, the very process by which they pass away hastens in them the production of seed, so that the species may be preserved. It is through the flower-bud mainly that we secure variation, and certainly in this light alone, the sexuality of trees and other plants is a wonderful provision for man, giving him such marvellous power over them. President Wilder and others have done so much for us in this direction that I need say no more on this point. But there is one suggestion that I wish to make for your observation and experiment. We accept the fact that the seed is changed by cross-fertilization, but we seem to take it for granted that the covering of the seed, that is, our "soft fruits," are not affected by cross-fertilization. I am disposed to think this is a mistake, that the fruits of certain plants are sensibly affected by the pollen from others.

Mr. Darwin has given* apparently well authenticated cases of the influence of pollen in changing the character of the covering of the seed in plants of very different kind, as *pease*, *palm-fruit*, *oranges*, *melons*, and *grapes*. The paragraph relating to apples we quote as follows :—

> "No case of the direct action of the pollen of one variety on another is better authenticated, or more remarkable, than that of the common apple. The fruit here consists of the lower part of the calyx, and of the upper part of the flower-peduncle, in a metamorphosed condition, so that the effect of the foreign pollen has extended even beyond the limits of the ovarium. Cases of apples thus affected were recorded by Bradley in the early part of the last century ; and other cases are given in old volumes of the Philosophical Transactions ; in one of these, a russeting apple and an adjoining kind mutually affected each other's fruit ; and in another case a

---

* Animals and Plants under Domestication. Vol. 1, pp. 479-81.

smooth apple affected a rough-coated kind. Another instance has been given of two very different apple-trees growing close to each other, which bore fruit resembling each other, but only on the adjoining branches. It is, however, almost superfluous to adduce these or other cases after that of the St. Vallery apple, which, from the abortion of the stamens, does not produce pollen, but, being annually fertilized by the girls of the neighborhood with pollen of many kinds, bears fruit differing from each other in size, flavor, and color, but resembling in character the hermaphrodite kinds by which they have been fertilized."

It is not to be expected that the fruit of all trees of the same species, as the apple for instance, would be equally sensitive to the action of foreign pollen. The *seeds* of all varieties of the same species are not equally affected by cross-fertilization. In the case of Indian corn, where cases of mixture of varieties are very abundant, it is well known to observers that the kernels of some varieties are much more affected in form and color by foreign pollen than of others. An analogous difference among animals of the same species is observed by breeders. Some mares give colts like the sire, while others stamp upon the young their own characteristics.

It is not probable that the St. Vallery apple is the only kind that is specially sensitive to this action of foreign pollen. Reasoning from the cases that are known of the change of the fruit-covering by cross-fertilization, and from analogy in the case of animals, we should infer that some trees would bear better fruit when planted in orchards by themselves, so that every tree could be fertilized by pollen from trees of its own variety, than when surrounded by trees of inferior kinds. This question of affecting the *covering* or *soft fruit* directly, for better or for worse, is entirely distinct from the question of benefiting the stock by crossing. That is a question of affecting the stock through new power, given to the seed by crossing with another variety; this is a question of affecting, through the action of pollen, the covering of the seed for a single year, through the influence of the same pollen that affects the seed itself.

When trees bear but few apples they are seldom as good as when there are plenty, though we might argue that a tree with but little fruit would be likely to bring it to greater perfection than when loaded with it.

May not this deterioration of fruit, when it is produced in small quantities, be in part due to the fact that when there are but few blossoms on the trees, each tree receives pollen from many trees through the action of the insects, while, when blossoms are abundant, the bees fertilize most of the flowers on a tree with pollen from other flowers on the same tree?

Although we in general rely upon the flower-bud of our fruit-trees for the production of new varieties, and upon the leaf-bud for the sure propagation of the variety when produced, yet the leaf-bud itself sometimes *sports*, in the language of the gardeners; that is, it gives a branch entirely different from the rest of the plants, so marked, in some cases, as to constitute a new variety. This is likely to occur in plants that are highly cultivated, and have been produced as the result of many variations from the original stock. Such sports I have seen also among geraniums and potatoes. The farmer sometimes finds potatoes in his field, such as he knew he did not plant, and such as he knows cannot be seedlings. As the potato-plant has produced many varieties, it naturally has a tendency to sport; and as the potato originates from an underground bud, and not from a root, and is itself a stem with regular buds or eyes, it is not strange that some of those buds should vary, and thus new kinds of potatoes appear to surprise the farmer who does not know this fact in plant-life.

Of the structure and nutrition of buds and the production of adventitious buds, I have not time now to speak. The subject will undoubtedly be carried on by President Clark, as he intended to carry it on when the committee was first named. P. A. CHADBOURNE.

After some discussion, the essay was laid over.

MR. MOORE, from the Committee to consider and report upon the time and place of holding the next public meeting, submitted a report as follows:—

The Committee appointed to fix the time and place for the next public meeting of the Board, have considered the subject assigned them, and make the following—

REPORT:

They have received applications from the Middlesex North Society to hold their next meeting at Lowell, and from the Waltham Farmers' Club to hold their meeting at Waltham; and after a full consideration of the subject in all its bearings, recommend that the meeting be held in the town of Waltham on the fourth, fifth and sixth days of December next.

JOHN B. MOORE.
O. B. HADWEN.

The report was accepted, and the place and time fixed accordingly.

Voted, That the Secretary be requested to invite contributions to an exhibition of plants, fruits, vegetables, etc., at Waltham, similar to that at Worcester.

Dr. WAKEFIELD, for the Committee on changes in the times of holding fairs, submitted the following:—

The Committee to whom was referred the petitions for alterations in the times of holding the meetings of several agricultural societies, would report that they have heard the parties so petitioning, and ask leave to submit the following—

REPORT:

Deerfield Valley shall be held on the second Thursday after the first Monday of September.

Hampshire, on the third Tuesday.

Essex, on the third Tuesday, *after the present year.*

Hampden, on the fourth Tuesday.

Hampden East, on the third Tuesday.

The report was accepted, when the Board

Adjourned.

Third Day.

The Board met at ten o'clock, A. M., Col. Leverett Saltonstall in the chair.

Present: Messrs. Bagg, Baker, Bennett, Burnap, Chadbourne, Comins, Davis, Fenn, Goessmann, Hadwen, Hersey, Johnson, Knowlton, Knox, Lewis, Loring, Merrill, Moore, Perry, Phinney, Russell, Saltonstall, Arthur A. Smith, Metcalf J. Smith, Milo J. Smith, Upham, Vincent, Wakefield and Wilder.

Mr. Knox, for the committee appointed to report upon the assignment of delegates, submitted the following: To the—

Essex,	Alexander Macy, Jr.
Middlesex,	Geo. B. Loring.
Middlesex North,	Metcalf J. Smith.
Middlesex South,	John E. Merrill.
Worcester,	J. N. Bagg.
Worcester West,	Milo J. Smith.
Worcester North,	H. P. Wakefield.
Worcester North-West,	Arthur A. Smith.
Worcester South,	Henry C. Comins.
Worcester South-East,	Henry S. Russell.
Hampshire, Franklin and Hampden,	John A. Hawes.
Hampshire,	Hebron Vincent.
Highland,	Elijah Perry.
Hampden,	Chas. G. Davis.
Hampden East,	Edmund H. Bennett.
Union,	Nathaniel Upham.
Franklin,	Geo. M. Baker.
Deerfield Valley,	Jas. T. Burnap.
Berkshire,	A. H. Holland.
Hoosac Valley,	E. T. Lewis.
Housatonic,	William Knowlton.
Norfolk,	E. C. Hawks.
Hingham,	Paul A. Chadbourne.
Bristol,	William E. Johnson.
Bristol Central,	O. B. Hadwen.
Plymouth,	D. B. Fenn.
Marshfield,	S. B. Phinney.
Barnstable,	Edmund Hersey.
Nantucket,	F. C. Knox.
Martha's Vineyard,	Stephen Shepley.

The report was accepted, and the assignment made accordingly.

President CHADBOURNE, on behalf of the Committee appointed to report a list of subjects and committees, submitted the following:—

1. *Saving and Preparation of Manures on the Farm.*—Messrs. Wakefield, Fenn and Burnap.
2. *The Improvement of Salt-Marshes.*—Messrs. Goessmann, Baker, and Davis.
3. *Field and Garden Seeds.*—Messrs. Moore, Hadwen, and Holland.
4. *The Sources of Agricultural Improvement.*—Messrs. Loring, Bennett, and Metcalf J. Smith.
5. *The Claims of Ornamental Gardening upon Farmers.*—Messrs. Saltonstall, Perry, and Moore.
6. *Experiments in Potato Culture.*—Messrs. Knox, Shepley, and Comins.
7. *What has Chemistry done for Agriculture?*—Messrs. Chadbourne, Goessmann, and Saltonstall.
8. *The Legal Rights and Obligations of Farmers.*—Messrs. Bennett, Davis, and Arthur A. Smith.
9. *The True Means of Promoting the Efficiency of Agricultural Societies.*—Messrs. Moore, Wakefield, and Baker.
10. *Farmers' Institutes.*—Messrs. Bagg, Macy, and Upham.
11. *Green Crops as a Manure.*—Messrs. Merrill, Milo J. Smith, and Knowlton.
12. *Shallow and Subsoil Ploughing.*—Messrs. Fenn, Johnson, and Shepley.
13. *The best Methods of Offering Premiums by Agricultural Societies.*—Messrs. Hersey, Moore, and Sargent.
14. *Reclaiming of Swamp Lands as to Profit and Effect upon the Health of Communities.*—Messrs. Sargent, Russell, and Hawks.
15. *Jersey Cattle, their Introduction, and Dairy Interests in the State.*—Messrs. Sargent, Hadwen, and Knowlton.

The Committee to nominate two members of the Examining Committee of the Agricultural College, submitted the names of Charles S. Sargent and J. N. Bagg. The nomination was confirmed.

Professor GOESSMANN then submitted his—

FOURTH ANNUAL REPORT ON FERTILIZERS.

To the State Board of Agriculture.

GENTLEMEN:—An impartial examination into the late history of our home trade in commercial fertilizers cannot fail to show a favorable change in the commercial management of this important branch of industry as compared with previous periods. The expectation that our laws for the regulation of the trade in these articles would ultimately revolutionize the hitherto customary mode of selling fertilizers is already realized to a considerable extent, even at this early stage of operations. To sell all commercial fertilizers with reference to the amount and peculiar condition of the essential elements of plant-food which they contain, receives additional indorsements from year to year from those who desire to have the competition of their articles of merchandise carried out on the same conditions which control commercial transactions in the general market. Subsequent detailed descriptions furnish ample proofs in that direction. Voluminous business circulars, filled mainly with a more or less arbitrary selection of accounts of results obtained by the use of the particular fertilizing material recommended, and at the same time conspicuously deficient in the more important information concerning the chemical composition and the character of its proximate constituents, meet deservedly with less favor on the part of intelligent farmers who have of late sought to ascertain rather the amount and the form of each essential element of plant-food present as well as the price charged per pound of phosphoric acid, potassa and nitrogen, than to depend on indorsements, however flattering. The readiness shown by the majority of manufacturers, importers and dealers to comply with the requirements of our fertilizer laws has apparently greatly increased the confidence of the farming community in the quality of the articles presented for their patronage. There are, however, a few noted manufacturers and dealers, mostly outside of this State, who have thus far disregarded their obligation to secure a license for their agents. As ignorance concerning our laws cannot any longer be consistently considered an excuse for their proceedings, it becomes an act of justice towards those who comply with our restrictions that the agents of unlicensed parties should be held and made responsible for their unlawful sales. A publication of the names of those manufacturers and others who have been selling during the past year through agents or resident dealers, without having previously secured a license, would serve as a warning to the latter, reminding them of the responsibility they incur in thus acting.

The question regarding the pecuniary advantages resulting from a judicious application of the commercial fertilizers in our farm industry has received during the past year an increased attention, and there are fair prospects of an active demand for these articles to test their respective merits more thoroughly under varied circumstances. The preparation of waste products of various branches of industry engaged in the working up of vegetable and animal products has received more care, and they are thus better qualified to be sold by chemical analysis. Extensive bat guano deposits, which have been known for some time to exist in some of the Southern States, have attracted considerable attention during the past year, in consequence of numerous analyses published by Professor McMurtrie, chemist to the National Department of Agriculture at Washington, D. C. The prices of many compound standard fertilizers have been lowered, and their market value has thereby been brought in better harmony with the cost of phosphoric acid, potassa and nitrogen in their main staple resources, for general supply. The indications are that the retail prices, as subsequently stated, of these three chief ingredients have reached a point which in all probability will remain stationary for some time to come. We expect to dispose of all we have at home, and our present prices offer no particular inducements for exportation to foreign countries.

The following statement of prices is mainly based on the ruling retail market prices during the past year in Boston and New York City :—

		Price per pound.
I. *Nitrogen*,	in form of ammonia and nitric acid,	25 cents.
	in form of dried ground meat and blood, finely pulverized steamed bones, finely ground fish-guano, Peruvian guano, urates, poudrettes, and artificial guano,	20 to 21 "
	in form of fine ground bones, fine ground horn, and wool-dust,	18 "
	in form of coarsely ground bones, horn-shavings, and woollen rags, human excretions and barn-yard manure, fish-scraps, animal refuse-matter from glue-factories and tanneries, etc.,	15 "
II. *Phosphoric acid*,	soluble in water, as contained in alkaline phosphates and superphosphates,	12.5 "
	in Peruvian guano and urates,	9 "
	in form of so-called reduced or reverted acid,	9 "
	in precipitated bone-phosphate, steamed fine bones, fish-guano, according to size and disintegration, from	5 to 6 "
	in form of boneblack waste, wood-ash, Caribbean guano, ground bone-ash, coarsely ground bones, poudrette, barn-yard manure, etc.,	5 "
	in form of finely ground South Carolina and Navassa phosphates,	3.5 "
III. *Potassium oxide*,	in form of muriate of potash or chloride of potassium,	6 "
	in form of sulphate of potassa in kainits,	7.5 "
	in form of higher grades of sulphate of potassa,	9 "

Some dealers have published valuations of their own, to show the superiority of the articles they offer to their customers. Wherever they are of a general interest, they have been mentioned in connection with the description of the fertilizers they refer to. Our farmers do well to render themselves familiar with the market prices of our fertilizing materials, and to study statements like the preceding one. As the law requires of all dealers in fertilizers to attach to each package of those which sell at more than $15 per ton, a specified printed record of the amount and the form of phosphoric acid, of potassa, and of nitrogen which they contain, an acquaintance with the ruling market values of their ingredients will enable them to ascertain for themselves the comparative pecuniary values of the various fertilizers presented for their patronage. Every intelligent commercial business transaction necessitates some figuring; we cannot expect to secure the best and cheapest without taking some trouble. The future success of our *fertilizer laws*, which are *designed* to secure *good* and *cheap fertilizers to the farmers* and a *fair chance* of *establishing* a *good reputation to the skilful manufacturer and the honest dealer*, depends in a controlling degree hereafter on the interest which our farmers will take in seeing to it that the one provision of our laws in particular is complied with, which demands that an intelligent analytical statement, as specified in section 1, shall accompany each package, and thus render the dealer responsible for a definite character and value of the purchased fertilizer. Farmers ought to refuse to buy of dealers who try to evade responsible sales. Nothing short of this will secure to them the full benefit of our laws.

Within the subsequent pages are recorded the results of from 60 to 70 analyses, which have been made during the past year. The chemical analytical examinations have been extended, as in previous years, as far as chance and time has permitted, over a larger field than the law prescribes, for the purpose of entering on file the chemical composition of all kinds of waste products resulting from our various branches of home industry, which may find a useful application for manurial purposes and may thus assist in increasing our resources for home-made fertilizers. The subjects are treated in a similar order as in previous reports.

I.—Potash Fertilizers.

The consumption of the various kinds and grades of the German potash-salts is steadily increasing. The lower grades, known by the names of "*natural* and *artificial kainits*," represent during the past as in previous years, the main quantity used. One firm alone, in Baltimore, claims to have sold over ten thousand tons of the former. The "*muriate of potash*," on account of its high concentration and its comparative low cost, has been more generally applied than before. The higher grades of the sulphate of potassa have been in considerable demand for the cultivation of tobacco, potatoes, and other special crops. The supply of this kind of potash-salts from Germany has been insufficient, and at the same time it has been of a doubtful character. To meet an urgent demand, quite a considerable quantity of the muriate of potash has been converted, by parties in Boston and New York City, into sulphate of potassa by means of sulphuric acid. Some of these products contained as high as 78 per cent. of sulphate of potassa, or 42 to 43 per cent. of potassium oxide; many, however, only from 30 to 35 per cent. of the latter. The subsequent analytical statements give a fair representation of the character of the various qualities of the German potash-salts sold within the State.

A.—MURIATE OF POTASH.

	I.	II.	III.	IV.
Potassium oxide,	50.70	52.89	50.42	52.40
Sodium oxide,	7.84	7.20	8.73	8.89
Chlorine,	49.33	–	47.94	–
Moisture,	2.60	2.50	3.67	–
Insoluble matter (in water),	0.80	–	–	0.44

These samples were obtained from dealers in Boston (I., II., IV.) and in Greenfield, Mass. (III.); their stated composition corresponded quite closely with the represented value; they contained from 80 to 84 per cent. of muriate of potash, or chloride of potassium, and from 13 to 16 per cent. of chloride of sodium or common salt; their retail price has been from $55 to $60 per ton of 2,000 pounds, or from 5.5 cents to 6 cents per pound of potassium oxide, making the *muriate of potash one of the cheapest sources* of the latter for general agricultural purposes. The prospects are, that in case of a European war, its price will be raised in consequence of an increased demand for the manufacture of saltpetre for gunpowder.

B.—Sulphate of Potassa.

	I.	II.	III.	IV.
Potassium oxide,	35.44	33.40	30.82	32.50
Sodium oxide,	5.50	4.50	8.59	2.17
Calcium oxide,	trace.	trace.	trace.	0.62
Magnesium oxide,	trace.	trace.	trace.	0.28
Sulphuric acid,	52.10	59.30	42.34	45.10
Insoluble matter (in water),	0.44	0.88	0.60	9.04
Moisture,	0.20	0.19	–	–

These samples are taken from home-manufactured articles; Nos. I., II., III. are produced from the muriate of potash, as above mentioned, by means of sulphuric acid; No. IV. comes evidently from some other branch of chemical industry. They consist mainly of the sulphates of potassa and soda, besides more or less of free sulphuric acid, or acid sulphates; namely, from 57 to 65 per cent. of neutral sulphate of potassa, and from 5 to 20 per cent. of neutral sulphate of soda, besides from 5 to 24 per cent. of sulphuric acid. The potassium oxide contained in these salts has been sold in small lots at from 8.5 to 9.5 cents per pound; or from $60 to $65 per ton of 2,000 pounds of the salines.

C.—Magnesia containing Potash-salts *(Kainits).*

	I.	II.	III.
Potassium oxide,	25.02	24.82	9.69
Sodium oxide,	–*	7.17	16.36
Magnesium oxide,	8.40	11.97	4.54
Calcium oxide,	2.92	–*	1.61
Sulphuric acid,	17.62	17.20	9.86
Chlorine,	–*	–*	–*
Insoluble matter (in water),	2.90	–	5.17
Moisture,	5.50	5.40	10.00

* Not determined.

Samples I. and II. are artificial kainits, or calcined potash, refuse-salts; No. III. represents the composition of Stassfurt dung-salt; the former were obtained of dealers in Boston, the latter of a dealer in Springfield, Mass. Every one of these three articles contained from 4.5 to 5 per cent. of chloride of magnesium; Nos. I. and II. contained from 14 to 15 per cent. of chloride of sodium or common salt, whilst No. III. contained from 30 to 31 per cent. of that compound. All three salines were fair specimens of their kind, yet they did not contain the entire amount of potash in the form of sulphates, as represented in the analysis of the dealer. This fact appeared not less surprising to the importer than to the customer, for the cargoes from which they had been taken were certified to by Dr. Ulex of Hamburg, Germany, as sulphates of potassa. Having good reasons to believe in the fairness of the latter, I decided to ascertain his opinion regarding the management of the trade in Stassfurt potash-salts at Hamburg. As the courteous reply of Dr. Ulex contains some statements which are of interest to importers and dealers in German potash-salt, I enter here on record his remarks regarding the question under discussion:—

"Our exporters of the Stassfurt potash-salts distinguish between 'muriate of potash,' 'kainits,' and 'dung-salts.' The percentage of potassium oxide is determined in every one of these cases as potassium, platino, chloride. The results thus obtained are stated in the case of the muriate of potash as chloride of potassium, whilst in the case of dung-salts and kainits they are calculated as sulphate of potassa. No particular attention is directed to the exact amount of the electro-negative or acid-constituent of the potassium compound, for the latter element is considered the essential constituent of the potash-salts. There can be scarcely any doubt that in some cases a part, although quite small, of the potassium in the muriate of potash will be present as sulphate of potassa, whilst in dung-salt and kainit, sometimes the amount of sulphuric acid may not be sufficient to entitle it to the assumption that the entire amount of potassium found is present as sulphate of potassa. The above stated practice to represent the character of the potash-salts has been adopted since the beginning of the trade in these potash-salts, and has not been criticised until quite recently. During the present year a complaint has been made by another party in America, regarding our above-mentioned mode of representing the quality of our potash-salts. On that occasion I have advised the parties interested to signify in the future the quality of salts they wish to buy, and to insist upon getting an article which contains enough of sulphuric acid to warrant the character of the potash they bought."

This communication leaves no doubt about the question who will be considered responsible hereafter for not furnishing to the farmers the articles desired by them. The issue at stake is not whether the dealers consider the chloride of potassium as good and efficient in the end as the sulphate of potassa, but that the purchaser gets what he wants and pays for. Nobody denies the great agricultural value of both the artificial and native kainit; yet, however valuable the accumulated practical experience of European agriculturists regarding the action of these potash-salts deservedly ought to be considered, it does not relieve us from the task to study carefully their successful modes of operation upon our soil, and under the influence of different climatical conditions. In view of the daily increasing evidence, that the peculiar form in which the potassium is applied, as well as the character of its associated compounds, not unfrequently exerts a more or less favorable influence on the crops raised under their treatment, it becomes very desirable that a fair chance should be secured, particularly in our present still limited state of experience at home, to *experiment* with *potash-salts* of a *reliable*, *definite character*.

ASHES OF THE HULLS OF COTTON-SEEDS.

Potassium oxide,	21.30	per cent.
Sodium oxide,	7.80	"
Calcium oxide,	10.58	"
Magnesium oxide,	3.90	"
Sesquioxide of iron,	1.50	"
Phosphoric acid,	9.86	"
Moisture,	9.20	"
Insoluble in acids,	13.20	"

This valuable ash was sent on for an examination by parties outside of the State, with the information that it was offered for sale at New Orleans, La., at from $15 to $20 per ton of 2,000 pounds. Now and then cargoes of similar articles are sent to our Northern seaport cities, where an ash, like the above described one, if guaranteed, is worth nearly twice the amount mentioned.

REFUSE-SALTS FROM GUNPOWDER-WORKS.

	I.	II.
Potassium oxide,	23.24	23.44
Sodium oxide,	25.57	25.50
Nitric acid,	12.69	12.40
Sulphuric acid,	–*	–*
Chlorine,	–*	–*
Moisture,	4.24	–

* Not determined.

The above sample came from a factory in the eastern part of the State. Like all refuse materials, it is liable to vary seriously in composition in different lots. Containing, as above reported, 23 per cent. of potassium oxide and 12 per cent. of nitric acid, its commercial value is equal to from $38 to $40 per ton of 2,000 pounds in our market.

SALTPETRE WASTE.

Potassium oxide,	30.94
Sodium oxide,	22.08
Calcium oxide,	0.83
Magnesium oxide,	0.09
Nitric acid,	11.50
Chlorine,	37.66
Sulphuric acid,	4.85
Moisture,	2.00

The sample was collected at a store in Springfield, Mass., and represented to be a refuse article from a saltpetre manufactory in Connecticut. It consisted mainly of potassium chloride and nitrate, besides some 40 per cent. of sodium chloride and sulphate. This salt is evidently resulting from the treatment of chloride of potassium and nitrate of soda, for the purpose of manufacturing saltpetre. It is worth in our market from $44 to $45 dollars per ton of 2,000 pounds. Salines like this deserve a recommendation as special fertilizers for the production of grain crops, as well as grass and forage crops in general. The only objection which might be raised against its reliability consists in the unusual variations in composition which have been noticed in these refuse salines. Saltpetre waste can only be relied on when accompanied with a specified analysis regarding its percentage of nitric acid and potassium oxide.

WASTE LIME FROM A GAS-HOUSE.

	I.	II.
Moisture and volatile organic matter, ...	21.60	24.00
Calcium oxide, ...	44.28	40.00
Sulphur (= sulphuric acid, 5.0—4.35), ...	2.00	1.74
Insoluble in mineral acids, ...	5.28	15.00

The waste lime from gas-houses varies to a considerable degree in regard to the absolute quantity, as well as to the relative proportion of its essential constituents; the state of moisture usually controls the former; while the quality of the quicklime used, and the way in which it has been turned to account, decides mainly the latter condition. The essential constituents of gas-house waste lime in its fresh state, are carbonate of lime, hydrate of lime, sulphide and hyposulphite of lime, with a varying, yet small quantity of the products of dry distillation of coal,—as carbolic acid and higher hydrocarbons, etc. This waste material ought to be well exposed to the action of the air before it is applied as a fertilizer, for it is desirable that the sulphur should be higher oxidized, to sulphuric acid, on account of the injurious action of the sulphur, and its lower oxidations on growing plants. For this reason it is safest to cast it broadcast during the autumn, and plough, or rather harrow it under during the early part of the spring. The action on the soil and the vegetation is similar to that of air-slacked lime and sulphate of lime; and it deserves, therefore, a recommendation for some meadow lands,—for clover, tobacco, beans, pease, beets, etc.,—as a special fertilizer.

WARD'S FERTILIZER.

The material which served for the following analysis was collected of O. B. Hadwen, Esq., of Worcester, Mass. It consisted of a coarsely ground mass of white and black particles, and smelt of the product of a dry distillation of coal.

One hundred parts contained the following constituents:—

Calcium oxide (lime),	23.93
Sodium oxide,	14.57
Chlorine,	15.59
Phosphoric acid,	0.90
Sulphuric acid,	1.40
Insoluble in mineral acids, as sand, etc.,	11.80
Moisture at 100° to 110° C.,	16.36

These analytical results leave but little doubt that the fertilizer under discussion is, in the main, composed of waste lime, from gas-works, and refuse salt,—about 22 to 23 per cent. of the latter. Farmers can do much better than pay $15 for a mixture of 500 pounds of burnt lime and 480 pounds of refuse salt. An article prepared in that way could be furnished at from $5 to $6, and would be decidedly more reliable.

SULPHATE OF AMMONIA.

	I.	II.	III.
Nitrogen,	20.57	20.60	21.00
Ammonia,	25.00	25.18	25.50
Sulphuric acid,	59.30	–	60.00
Moisture,	2.70	–	2.00

Samples No. I. and II. were obtained from a dealer in Boston; No. III. from a dealer in Greenfield, Mass. All three samples were of good quality. The supply of the sulphate of ammonia has fallen short of the demand during the past year, causing a considerable advance of its price. At the beginning of the spring it sold at $95 per ton of 2,000 pounds, and it rose subsequently to $110 for the same quantity. The price per pound of nitrogen in that form has thus varied from 23.8 to 27 cents. The market value of the sulphate of ammonia depends, to some degree, on its demand in other branches of industry, where, at times, higher compensations can be realized for it than the farmers can afford to pay.

Although our chances for the manufacture of ammonium sulphate from the gas-house liquors and from the production of animal charcoal have not yet been exhausted, it is plain that the late cost of this article has reached a point where farmers do well to look for more economical substitutes. The sulphate of ammonia is a very efficient and also a very convenient form of nitrogen for experimental purposes, when the cost of material is still a matter of secondary consideration. Its importance as a source of nitrogen for general farm purposes, as far as quantity is concerned, has not materially changed from the position it occupied more than twenty years ago, when Von Liebig remarked, "Profitable farming will surely be a failure in case its success depends on an adequate supply of sulphate of ammonia." As soon as our farmers begin to appreciate the importance of preparing the various kinds of nitrogenous refuse material within their reach by a suitable mode of composting during the autumn for a more immediate action on the crops during the succeeding spring, there will be much less need for paying for high-priced ammonia compounds. By adopting more generally that course, large quantities of active nitrogen compounds of an equally efficient character may be secured, as a general rule, at more than one-third less cost per pound of nitrogen; for instance, from blood, refuse, bones, and meat, from slaughter-houses and glue-factories, animal waste matter of tanneries, fish, etc.

NITRATE OF SODA (*Chili saltpetre*).

Nitric acid,	60.82	per cent.
Sodium oxide,	35.68	"
Calcium oxide,	0.13	"
Magnesium oxide,	0.04	"
Chorine,	0.46	"
Sulphuric acid,	0.08	"
Insoluble matter (in water),	0.24	"
Moisture,	2.00	"

The sample was taken from the storehouse of a dealer in Boston; it contained 96.2 per cent. of nitrate of soda. The standard strength prescribed by the Peruvian government is

95.0 per cent. of that compound. The amount of nitric acid present is equal to 19.16 of ammonia or 15.77 per cent. of nitrogen. As the Chili saltpetre has been sold during the larger period of the past year at four cents per pound, or $80 per ton of 2,000 pounds in the retail trade, the nitrogen in that form has cost 25 cents per pound. The use of this nitrogen compound, as a top-dressing, after manuring with phosphates, receives increased attention.

DRIED BLOOD.

	I.	II.	III.
Moisture at 100 to 110° C., ...	18.50	8.46	12.25
Organic matter, ...	76.83	75.89	78.21
Ash constituents, ...	4.65	4.80	9.54
Nitrogen in organic matter, ...	10.70	9.14	9.06
Phosphoric acid in ash, ...	1.53	1.60	2.46

Sample No. II. was sold by a dealer in Chicago, Ill.; No. I. and No. III. were taken at a storehouse in Boston; No. III. consisted, as stated, of ground meat and blood, manufactured by a firm in Pawtucket, R. I. These articles have been used quite extensively as a source of nitrogen in compound commercial fertilizers; they are a very valuable material for that purpose, provided they have not been scorched by the use of too high a temperature during drying. As they disintegrate quite readily at ordinary temperature in the presence of moisture, they furnish during the first year of application a valuable source of nitrogen plant-food. One pound of nitrogen in the form of dried blood and dried meat has been sold at from 20 to 21 cents. There are several grades of dried blood in our market, as has been stated in previous reports.

WOOL-WASTE.

The material which has served for the subsequent analysis was obtained from a mill at Franklin, Mass., and consisted mainly of a coarse wool-refuse, apparently the sweepings of the mill. The sample tested lost at 100 to 110° C. about 10 per cent of water, and contained in its air-dry state 5.0 per cent. of nitrogen. Allowing from 14 to 15 cents per pound of nitrogen, which is its usual valuation in coarse wool-waste, the commercial value of the above sample would be $15 per ton.

The manurial value of the wool-waste depends upon its mechanical condition and on its percentage of nitrogen, which may vary as much as 100 per cent. from each other in different lots. To render coarse wool-refuse ready for assimilation requires a more thorough process of disintegration than in case of fine wool-dust. The latter, if incorporated in the barnyard manure during the autumn, will yield freely its nitrogen for plant-growth during the succeeding summer season. Coarse wool-refuse has been successfully composted with burnt lime, by forming alternate layers of both substances and covering the entire mass with moist earth from four to five inches thick. The compost thus prepared at the close of the year is, after a few turnings during the winter season, fit for an efficient spring application. Some recommend to work the wool-refuse with waste, containing sulphuric acid (1.5 to 1.6 specific gravity) at ordinary temperature into a paste, and to keep the mass from time to time stirring until the wool turns slimy, then to add subsequently for every 100 pounds of sulphuric acid used, 200 pounds of fine ground bones with a sufficient amount of water to merely moisten the entire mass. The material resulting is, after a week or two keeping, ready for use, and deserves no doubt a high recommendation, wherever rich nitrogenous phosphates are needed for a successful crop.

FINE HORN-WASTE.

The sample came from a factory at Leominster, Mass., and consisted of a white, fine powder. It contained in 100 parts,—

Moisture at 100 to 110° C.,	10.27	per cent.
Ash constituents,	1.05	"
Organic matter,	88.68	"
Nitrogen in organic matter,	16.10	"

Clean horn-waste is a rich nitrogenous substance, yet difficult to decompose; it ranks for this reason among the lowest in commercial value among our animal refuse substances; about 15 cents per pound of its nitrogen, provided it is in a good mechanical condition. One ton of the above sample is worth from $46 to $48. A thorough composting with barn-yard manure renders its nitrogen, under ordinary circumstances, best available.

Horn shavings, and the coarser refuse material of the same kind, are best subjected for a few hours to the action of steam of from three to four pounds of pressure, and subsequently dried and ground. Thus treated, they are easily ground, and act more rapidly on the vegetation.

ANIMAL DUST.

I.—BRIGHTON ANIMAL DUST.

	I.	II.
Volatile and animal organic matter, ...	70.08	71.76
Ash constituents.	29.92	28.24
Phosphoric acid in ash,.	9.97	9.80
Nitrogen in animal matter, ...	5.82	6.96
Moisture at 100° to 110° C., ...	17.57	11.92

Sample No. I. has been secured at the storehouse of Messrs. Bowker & Co., and No. II. at the store of Messrs. Hovey & Co., both in Boston. The mechanical condition of both articles was very good. Assuming them of the same state of moisture, their composition is as closely alike as can be expected under the circumstances, which are unavoidably connected with the management of a branch of business like the manufacture of fertilizers at the Brighton Abattoir. No. I. is too moist to keep well; the percentage of moisture in No. II. is more favorable for keeping without moulding, whilst in their original package. The articles sold per ton of 2,000 pounds at $40. Allowing for the phosphoric acid present the same price per pound as in the case of bones, namely, six cents, we find the cost of the nitrogen per pound in an average sample of both to be 22 cents. A well-prepared animal dust of the above composition, at $40 per ton, deserves a liberal patronage as an efficient, rich, nitrogenous phosphate. For speedy action it needs, however, a previous composting for a month or two.

II.—ACIDULATED BRIGHTON ANIMAL DUST.

(Messrs. Hovey & Co., Boston.)

Organic animal and volatile matter,	76.30	per cent.
Ash constituents,	23.70	"
Total phosphoric acid,	8.45	"
Soluble " "	6.72	"
Reverted " "	1.13	"
Insoluble " "	0.60	"
Total nitrogen,	6.00	"
Moisture,	15.75	"

This preparation differs from the previous ones in that it contains its main amount of phosphoric acid in a soluble form, and is thus better fit to meet the immediate wants of the crops. Its commercial value would be from $48 to $50 per ton, allowing ordinary rates of valuation in our market. It is offered at $45 per ton at the Brighton railroad depot.

ANIMAL FERTILIZER (TANKAGE).

Volatile and organic animal matter,	65.40
Ash constituents,	34.60
Phosphoric acid in ash,	14.60
Nitrogen in animal matter,	7.48
Moisture (at 100° C.),	5.46

This material consisted of the refuse meat and bone mass from a rendering establishment in Chicago. I enter the results here on record for the same reason that some other analytical statements of fertilizing substances have been reported in the present report; namely, to render the agricultural community more and more familiar with the character of the various articles, particularly refuse materials, offered for manurial purposes. Many of them may be secured at low rates. Always buy with reference to composition!

GROUND BONES.

I.—FINE BONES FOR FERTILIZERS.

(Messrs. L. B. Darling & Co., Pawtucket, R. I.)

	I.	II.
Moisture and organic matter,	42.88	48.36
Ash-constituents,	57.88	51.64
Phosphoric acid in ash,	23.74	21.60
Nitrogen in animal matter,	3.68	4.34
Moisture (at 100°–110° C.),	4.06	5.18

Sample I. was collected at the storehouse of Messrs. Bowker & Co., Boston, and sample II. at the storehouse of Messrs. Bagg & Batchelder, in Springfield, Mass. Both samples were of a good mechanical condition and a good composition; they sold at $40 per ton of 2,000 pounds.

II.—FINE GROUND BONES FOR FERTILIZER.

(Mr. John Bangs, Springfield, Mass.)

Moisture and organic matter,	56.88
Ash-constituents,	43.12
Phosphoric acid in ash,	22.07
Nitrogen in animal matter,	3.38
Moisture (at 100°–110° C.),	7.46

This article was sent on for my examination by a party in Springfield. It proved to be genuine bones, rather of coarser quality than the above two samples.

III.—FINE BONES FOR FERTILIZERS.

(Cumberland Company, Portland, Me.)

Moisture and organic matter,	48.70
Ash-constituents,	51.30
Phosphoric acid in ash,	21.90
Nitrogen in animal matter,	3.78
Moisture (at 100°–110° C.),	7.90

These bones were of a similar character as the preceding sample; they were collected at the store of Messrs. Arms & Co., Greenfield, Mass.

IV.—FLOUR OF BONE FOR FERTILIZERS.

(Mr. Benjamin Randall, South Boston.)

Moisture and organic matter,	44.10
Ash-constituents,	55.90
Phosphoric acid in ash (total),	21.94
" " soluble in citrate of ammonia,	6.34
Nitrogen in animal matter,	3.58

This sample was sent on by the manufacturer; it deserves notice on account of its fine mechanical condition and its comparative large percentage of soluble phosphoric acid.

V.—STEAMED BONES AND MEAT.

(Mr. James Byrnes of Springfield, Mass.)

Moisture and organic matter,	48.38
Ash-constituents,	51.62
Phosphoric acid in ash,	21.90
Nitrogen in animal matter,	3.86
Moisture (at 100°–110° C.),	6.05

This material was collected from a large stock at the factory; its general physical conditions were very good and its composition equal to the guaranty stated.

The phosphoric acid in the bones, steamed and raw genuine, is valued according to the mechanical condition of the bones; the same rule applies with equal force to the valuation of the nitrogen in their nitrogenous matter.

	Per pound.
Phosphoric acid of bones soluble in citrate of ammonia,	7 @ 8 cents.
Phosphoric acid in finely granulated steamed bones,	6 cents.
Phosphoric acid in coarsely ground bones,	5 "
Nitrogen in finely granulated bones,	18 "
Nitrogen in coarsely ground bones,	15 "

Farmers do well to take these points into consideration when buying their ground bones for fertilizing purposes. The composition of the above six samples differs not more than different lots of bones will be found to do. All, with but one or two exceptions most likely, have been rendered before being ground. Fine ground steamed bones have sold in small quantities at $40 per ton of 2,000 pounds. Unadulterated ground bones are furnished at that price, a valuable phosphatic fertilizer at a reasonable cost. Applied in time, they are more reliable in their influence on the crops than the common class of superphosphates, for the quality of the soil interferes, as a general rule, less with their action, than with that of the superphosphates.

BONEBLACK WASTE.

The sample was secured at the storehouse of Messrs. Bagg & Batchelder, Springfield, Mass.; it contained 33.71 per cent. of phosphoric acid, which is equal to 73.60 per cent. of bone-phosphate or tricalcic phosphate. A boneblack waste, like the one here stated, sells at $30 per ton. One pound of phosphoric acid sells thus, in that form, at 4.5 cents. Boneblack waste for agricultural purposes is best changed into a superphosphate.

DISSOLVED BONEBLACK.

This name was given to a concentrated superphosphate obtained by the treatment of boneblack with a sufficient amount of sulphuric acid to render the entire amount of phosphoric acid present soluble in water. The article tested was collected at the storehouse of Messrs. Bowker & Co., Boston, Mass., where it served as a source of soluble phosphoric acid for the manufacture of compound commercial fertilizers. It was represented to contain from 14 to 16 per cent. of soluble phosphoric acid. The analysis proved that 15.03 per cent. of phosphoric acid was soluble in water; the insoluble phosphoric acid present amounted to 0.8 per cent. The article sold at $36 per ton of 2,000 pounds, or 12.5 cents per pound of soluble phosphoric acid.

CARIBBEAN GUANO.—(*Orchilla.*)

Phosphoric acid,	27.12	per cent.
Calcium oxide,	34.91	"
Magnesium oxide,	2.63	"
Sulphuric acid,	2.36	"
Moisture (at 100° C.),	12.50	"

This mineral phosphate consists of phosphate of lime, sulphate of lime, carbonates of lime, and magnesia, with some organic matter. It is of a very friable character. Its retail price has been $25 per ton of 2,000 pounds in Boston. The main agency for this and similar phospho-guanos is in Baltimore, Md. The sample was taken at Messrs. Bowker & Co., Boston.

I.—BROCKVILLE MINERAL PHOSPHATE.

(Brockville Chemical and Superphosphate Works, Brockville, Ontario, Canada, A. COWAN, Manager.

Phosphoric acid (insoluble),	35.21	per cent.
Matter insoluble in hydrochloric acid,	6.46	"
Moisture,	2.50	"

It consisted of the very fine pulverized phosphatic rock apatite, which serves for the manufacture of superphosphates.

II.—BROCKVILLE SUPERPHOSPHATE.

(Mr. A. COWAN, Manager.)

Total phosphoric acid,	21.30	per cent.
Soluble phosphoric acid,	13.31	"
Reduced " "	0.69	"
Insoluble " "	7.30	"

These two samples were kindly presented by Mr. A. Cowan; they were accompanied with a few specimens of apatite, as found near Brockville. The superphosphate is a good article of its kind; it is offered for sale at the works, in small lots, at $30 per ton of 2,000 pounds; counting the soluble phosphoric acid at 12.5 cents per pound, the article represents a market value of from $33 to $34 per ton. The insoluble acid is here of but little value, and ought not to enter into the valuation.

PERUVIAN GUANO.

I.—(Messrs. Bagg & Batchelder of Springfield, Mass., March 27, 1876.—*Old Lot.*)

Volatile and organic matter,	64.74	per cent.
Ash-constituents,	35.26	"
Total phosphoric acid,	14.52	"
Nitrogen (= ammonia 13.70),	11.26	"
Potassium oxide,	1.89	"
Sand, etc.,	1.54	"
Moisture (at 100° C.),	22.61	"

II.—(Messrs. Breck & Co. of Boston, May 1, 1876.)

Volatile and organic matter,	51.24	per cent.
Ash-constituents,	48.76	"
Total phosphoric acid,	18.87	"
Soluble " "	5.00	"
Reverted " "	6.11	"
Insoluble " "	7.76	"
Nitrogen (= 9.74 ammonia),	8.02	"
Potassium oxide,	3.06	"
Sand, etc.,	6.00	"
Moisture,	18.73	"

III.—(Messrs. Arms & Co. of Greenfield, Mass., May 25, 1876.)

Volatile and organic matter,	46.60	per cent.
Ash-constituents,	53.40	"
Total phosphoric acid,	14.00	"
Nitrogen (= 9.6 ammonia),	7.85	"
Potassium oxide,	4.08	"
Sand, etc.,	10.52	"
Moisture (at 100° C.),	12.28	"

IV.—RECTIFIED PERUVIAN GUANO.

(Messrs. Bowker & Co., Boston, April, 1876.)

Volatile and organic matter,	64.52	per cent.
Ash-constituents,	35.48	"
Total phosphoric acid,	14.35	"
Soluble " "	11.26	"
Reverted " "	2.03	"
Insoluble " "	1.06	"
Nitrogen (= 10.7 ammonia),	8.86	"
Potassium oxide,	1.92	"

In my third official report (1875), I called the attention to the announcement of the agents for the consignees of the Peruvian government, Messrs. Hobson, Hurtado & Co. of New York City, that they proposed to distinguish, hereafter, between—

A.—Raw genuine Peruvian Guano; and
B.—Rectified genuine Peruvian Guano.

Samples Nos. I., II., and III. above properly belong to the first class of genuine guanos, and No. IV. to the second class. The rectified Peruvian guano is guaranteed to contain 10 per cent. of phosphoric acid soluble in water, 10 per cent. actual and potential ammonia, and 2 per cent. of potassium oxide. The sample tested (No. IV.) exceeds the guaranteed value.

Allowing 12.5 cents per pound of soluble phosphoric acid, 20 cents per pound of nitrogen, there are but 6 cents left per pound of potassium oxide (in the form of sulphate) to make up the price of the rectified genuine Peruvian guano to $60 per ton of 2,000 pounds, the amount charged for it in the retail trade at the office of the agents, No. 63 Pine Street, New York City. This new form of the Peruvian guano takes thus a foremost rank in the present condition of our trade in commercial fertilizers,—among the rich nitrogenous superphosphates,—on account of a reasonable price, as well as a suitable condition of its constituents for immediate action.

Encouraged, it seems, by the general favorable criticism which the introduction of a guaranteed rectified genuine Peruvian guano has received, on the part of all progressive agriculturists throughout the entire country, as well as animated with the intention to meet the more exacting regulations regarding the trade in commercial fertilizers, the parties interested in the sale of the genuine Peruvian guano are induced to make for the future some important concessions to their patrons at large in regard to the sale of the *raw genuine Peruvian guano*, which cannot fail to engage the serious attention of the farming community, as well as of the dealers in commercial fertilizers. A disinterested consideration of the stand-point assumed in two previous reports regarding the condition of our supply of Peruvian guano, renders it but an act of justice on my part, that any improvement in the mode of selling it should be promptly recognized, for the mutual benefit of dealers and consumers. To meet this obligation in the most acceptable way, I propose to enter here on record an abstract from a *business circular*, as far as it bears on the main question under discussion:—

"*Peruvian Guano Guaranteed.*—The guano found in the deposits lately discovered in Peru and on the Lobos Islands, contains the same fertilizing ingredients that characterized the *Chincha* and *Guanape* guanos, though in different relative proportions. The new guanos, as a general rule, contain less ammonia, but at the same time are considerably richer in phosphoric acid and potassa. It is a most noteworthy fact, which experience, as far as it goes, has established, that even among samples of guanos taken from the same locality, the less ammonia they contain, the larger is the proportion found in them of phosphoric acid and potassa. To such an extent is this the case, that, within certain limits, all Peruvian guanos are of the same agricultural value.

"However, as these facts were not suspected, and it had been the custom of the trade to sell Peruvian guano according only to the ammonia it contained, it was determined about a year ago, when the new guanos were placed on this market, to adopt guano of 10 per cent. ammonia as a standard, and to fix the wholesale price of this grade at $55 per ton, allowing a reduction of $3 per unit of ammonia (or 1 percentage of ammonia, making 20 pounds of ammonia less per ton of 2,000 pounds) on all grades below that standard. Formerly all guano below 13 per cent. of ammonia (= 10.7 per cent. of nitrogen) was sold at the uniform price of $58.50, gold, per ton; and only when it was of a higher grade was a larger price demanded for it. . . . Farmers have complained that they find stones in the guano, which, to a limited extent, is true. These stones proceed sometimes from the ballast of the vessels in which the guano is imported, and at other times they drift from the sides of the ravines in which the guano is contained in some of the southern deposits; but what is mostly looked upon as stones, is nothing but hardened or petrified guano, layers of which partially cover some of the new deposits. Farmers also complain of the lumpy condition of a portion of the raw guano, which requires crushing before being used, entailing both labor and expense.

"Scientists, on their part, contend that to place the fertilizing trade on a satisfactory basis, all fertilizers should be sold according to analysis, assigning to each of the fertilizing ingredients a fixed value; and these opinions are maintained with an array of arguments that cannot be controverted.

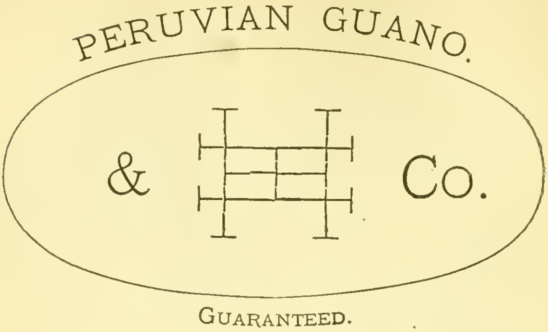
"Now, in order to remove all cause of complaint on the part of farmers, and to meet the views expressed by scientific men, and also to silence malicious reports from parties interested in the manufacture of fertilizers, the undersigned have resolved to offer to the public any desired quantity of Peruvian guano, in an unobjectionable form, while they will continue to sell the *raw guano* as imported under the established terms, to those who may wish to purchase it in that condition.

"To carry out the proposed object, individual cargoes will be dealt with in the following manner:—

"The guano will, in the first place, be screened, to separate the lumps and stones, if any. The latter will be taken out by hand, and the lumps will be crushed by machinery. Afterwards the entire mass will be thoroughly mixed to render it uniform, and samples will be judiciously selected and analyzed to test the uniformity of the mixture. This being obtained, the guano will be put into bags of 200 pounds each, on one side of which will be printed the usual lettering in a circular form; viz.:—

Warranted No. 1 Peruvian
Guano,
Imported into the
U. S. by
Hobson, Hurtado & Co.,
Agents
for the
Consignees of the
Peruvian Government.

"On the other side, the following trademark will be stamped:—



"Below this trademark will be printed the *analysis* of the guano, indicating the percentage of *ammonia, soluble phosphoric acid, reverted** phosphoric acid, insoluble phosphoric acid, and potassa contained in the guano.

"Lastly, below the analysis, will be marked the price of the ton of 2,000 pounds, calculated after the following rates:—

"The ammonia will be valued at the rate of . . .	$3 50	per unit.
soluble phosphoric acid will be valued at the rate of	2 00	"
reverted phosphoric acid will be valued at the rate of	1 60	"
insoluble phosphoric acid will be valued at the rate of	40	"
potassium oxide acid will be valued at the rate of .	1 50	"

"These values correspond to—

"For ammonia (or nitrogen, per pound, $0.21⅓), .	$0 17½	per pound.
soluble phosphoric acid, ...	0 10	"
reverted phosphoric acid, ...	0 08	"
insoluble phosphoric acid, ...	0 02	"
potassa (as phosphate of potassa), ...	0 07½	"

"The prices established as above, and stamped on the bags, will be the retail price in all ports in the Atlantic States.

"It must be evident to every one, that Peruvian guano, treated as herein explained, and which will be called "*Peruvian Guano Guaranteed*," will be free from the complaints which farmers have sometimes made against the raw article sold as imported. Nor is the guaranteed guano liable to be misrepresented by those interested in depreciating all fertilizers, except those they are interested in.

---

* By *reverted* (or reduced) *phosphoric acid* is understood phosphoric acid which, although not soluble in water, becomes so under the chemical conditions of the soil. The test of this is, that the phosphoric acid be in a state to promptly dissolve in a solution of citrate of ammonia, and such is the case with the greater part of phosphates contained in Peruvian guano.

"Lastly, the system of selling this fertilizer according to analysis, so strongly advocated by scientific agriculturists, is here carried out in the most complete manner. In purchasing 'Guaranteed Guano,' the farmer will for the first time, as in the 'Rectified Peruvian Guano,' know precisely what he buys and exactly what he pays for it.

"It is neither intended, nor can it be expected from what precedes, that all guaranteed guano shall be of the same grade; that is to say, shall show the same analysis. But a cargo being thoroughly mixed and samples from it analyzed, the lowest analysis obtained will be the one adopted for stamping on the bags; so that the contents of each bag are guaranteed to analyze as well, if not better, than marked upon it. No range, no margin is in this respect claimed in favor of the seller.

"Should any one wish to convince himself how cheap the fertilizing ingredients are sold in the guaranteed guano without consulting the tables formed for this purpose, let him take any of the good brands of fertilizers and ascertain its analysis. Now, to estimate what such a fertilizer would be worth, at the rates at which the same kind and quantity of plant-food would cost in guaranteed Peruvian guano, proceed in the following manner:—

"Multiply each unit, or the percentage of ammonia in the fertilizer by $3.50 (or if instead of ammonia the percentage of nitrogen be given, allow $4.25 per unit). Multiply the percentage of soluble phosphoric acid by $2; multiply the percentage of reverted phosphoric acid by $1.60 and the percentage of insoluble phosphoric acid by forty cents; for potassium oxide, if any, multiply the percentage by $1.50. Add together these products, and the sum will be the value of the fertilizer at the rate that the same ingredients can be purchased in Peruvian guano guaranteed.

"Now, if the value of the fertilizer in question, according to the above rule, be less than its retail price, the difference between the two will show how much *dearer* per ton the fertilizer is than the same quantity of plant-food in Peruvian guano guaranteed. If, on the contrary, the estimated value of the fertilizer were greater than its retail price, the difference would show by how much a ton of the fertilizer would be cheaper than the same amount of plant-food in the guano.

"Particular attention is called to the fact that the guaranteed guano undergoes no other preparation but such as the *raw* article would receive from the farmer himself, previous to applying it to the soil; viz., taking out stones, if any, and crushing the lumps; but this being done by machinery, it is much more effectually accomplished than could be performed on a farm, and it enables the sellers to offer the article in unobjectionable condition, and to guarantee the analysis of *each* bag. Furthermore, in order to prevent, if possible, the adulteration of guano,—a practice which has, unfortunately, been carried on to some extent,—the twine with which the mouth of the bag is sewn will have a *lead seal* attached to each extremity, so that if the bags be tampered with it may be easily detected.

"Thus every means has been adopted and every precaution taken to satisfy the legitimate expectations and protect the interest of farmers who employ Peruvian guano as a fertilizer.

"As a specimen of the composition of the 'New Peruvian Guano,' we subjoin the analysis and estimate of the retail price per ton of the *first* cargo offered for sale, now on hand:—

"CARGO A.

"Ammonia,	6.80	per cent.,	at $3 50 =	$23 80
"Soluble phosphoric acid,	3.80	"	at 2 00 =	7 60
"Reverted phosphoric acid,	11.50	"	at 1 60 =	18 40
"Insoluble phosphoric acid,	3.00	"	at 40 =	1 20
"Potassa (phosphate),	3.70	"	at 1 50 =	5 55
"Estimated retail price,				$56 55

"Marked on bags for sale, $56.

"The analysis of subsequent cargoes of guaranteed Peruvian guano as offered for sale will be published from time to time.

"N. B.—The sale of No. I. raw Peruvian guano of 10 per cent. ammonia standard is continued under the same terms and conditions as heretofore.

"HOBSON, HURTADO & CO.,
" *Government Consignees of Peruvian Guano.*

"NEW YORK, July, 1876."

This circular, it must be conceded, is one of the most encouraging signs during the past year regarding a healthy development of our home retail trade in commercial fertilizers. Publications of a similar character regarding their valuable fertilizing material on the part of some of our leading manufacturers of home-made fertilizers, as fish guano, animal dust, bones, standard superphosphates, etc., would greatly aid to shorten the time for placing the entire trade in commercial fertilizers on the basis justly desired by the farmers; namely, a practical responsibility on the part of the dealer regarding the guaranteed composition, and also a proof that the prices charged for their various essential constituents shall be within a reasonable limit of those recognized in the general market. These two conditions are indispensable for a successful use of commercial fertilizers; farmers cannot afford to be satisfied with less concessions on the part of the dealers in those materials. Nothing has kept down the trade in commercial fertilizers as much as the want of confidence in the articles offered for sale. Those who invite impartial investigation in their transactions base their future business operations on the most promising foundation, for the call for reliable fertilizers is steadily increasing, the resources of the farming community to ascertain their true character becomes daily more systematized, and thus the time is fast approaching when increased patronage will recognize true merits, and thereby repay for the exertions made. There is no reason why the fertilizer trade, once carried on on the same principle which secures success in other branches of commercial industry, should not bring a satisfactory return for risks incurred and skill displayed in its management.

Since the above-mentioned circular has been issued, another cargo of guaranteed Peruvian guano has entered our market; it is offered for sale at $70 per ton of 2,000 pounds; its composition is stated to be as follows:—

CARGO B.

Ammonia,	11.50	per cent.
Soluble phosphoric acid,	5.40	"
Reverted " "	10.00	"
Insoluble " "	1.70	"
Potassa,	2.30	"

The safest course for farmers hereafter is to buy only those kinds of Peruvian guano which are sold as *guaranteed* articles. Nos. I., II., and III. of the samples above were collected before the circulars came to hand. No I. was represented as an old lot on hand; No. II. was sold as No. I. warranted; the same was the case with No. III. They differed somewhat in composition, rather in favor of the consumer than the dealer; they were fully worth the money paid for them, when calculated according to ruling market prices.

BAT GUANO.

	I.	II.	III.
Volatile and organic matter,	89.40	94.50	82.67
Ash constituents,	10.60	5.50	17.33
Phosphoric acid,	3.84	2.81	5.54
Nitrogen,	9.69	10.51	7.86
Moisture (at 100° C.),	29.65	10.25	29.88
Sand, etc.,	0.20	0.60	0.87

The samples which served for these analyses were stated to have been taken from three different deposits in Texas. The first information regarding such deposits within the country I received at an early date in 1875, through a letter from a party in Austin, Texas. The following description was given :—

> "The lands upon which the bat deposit is located are situated on the southern line of Llano County. The deposit exists in a cave in carboniferous limestone, and extends about three-quarters of a mile into the mountain ridge, where it is made by millions of bats covering the ceiling and walls of the cave. The guano looks like a sample of Peruvian guano now before me. A superficial examination has convinced me that it contains a considerable proportion of nitrate of lime. Exposed to moist air it becomes sour; the floor of the cave, which consists of limestone, is everywhere impregnated with nitrate of lime. During the war, it is stated, attempts were made to turn the guano and its surrounding limestone to account for the manufacture of saltpetre for gunpowder. The deposit amounts to at least one thousand tons."

Professor McMurtrie, the able chemist to the National Department of Agriculture, has published in the department's report of May and June, 1876, a very interesting paper on the occurrence of bat guano deposits within the United States. According to his statement they are quite numerous, extending over an extensive area from Virginia to Texas. Short descriptions are given of deposits in Virginia, Kentucky, Tennessee, Alabama, Arkansas and Texas. The analyses of samples from seven different deposits show a great variation in composition and value; the latter varies from $15 to $55 per ton. The variation is largely due to differences in moisture (from 2.5 to 44 per cent.), and to admixtures of sand, etc. (from 0.46 to 62 per cent.). The main constituents of a bat guano are the excretions of these animals, which consist largely of the wings and other scaly parts of the insects they feed on, besides the remnants of decaying bats. The large amount of nitrogen which the former contain causes the value of the bat guano in most instances. Bat guano has been used for years for agricultural purposes in Europe and elsewhere. Large deposits have been found in Poland, Hungary, Italy and Egypt; the bat guano from the latter country has been found to contain in some cases as high as 37.2 per cent. of nitrogen, whilst some samples from Hungary contained but 1.8 per cent. of nitrogen in the presence of 11.54 per cent. of insoluble phosphoric acid. From what has been stated in this connection it is scarcely necessary to add that none but guaranteed articles ought to be bought by farmers.

The samples which served for my examination I owe to the kindness of Professor Wm. McMurtrie of Washington, D. C. and W. H. Bowker, Esq., of Boston, Mass. Their respective commercial value, allowing 18 cents per pound of nitrogen and five cents for one pound of phosphoric acid, varies from $33 to $38 per ton of 2,000 pounds.

AMMONIATED SUPERPHOSPHATES AND SUPERPHOSPHATES.

I.—AMMONIATED SUPERPHOSPHATE OF MESSRS. O. FOOTE & CO., BOSTON.

(Collected of Messrs. W. H. Bowker & Co., Boston, Mass.)

Total phosphoric acid,	11.93 per cent.
Soluble " "	6.17 "
Reduced " "	4.69 "
Insoluble " "	1.07 "
Nitrogen,	1.48 "
Moisture,	33.48 "

Valuation per ton of 2,000 pounds.

123.4 pounds of soluble phosphoric acid,	$15 42
93.8 " of reduced " "	8 45
21.4 " of insoluble " "	1 28
29.6 " of nitrogen,	6 22
	$31 37

II.—PURE COMBINED GUANO OF MESSRS. WILLIAMS & HAVEN.

(Collected of Messrs. Bagg & Batchelder, Springfield, Mass.)

Total phosphoric acid,	15.85 per cent.
Soluble " "	0.64 "
Reduced " "	– "
Insoluble " "	15.21 "
Nitrogen,	2.33 "
Potassium oxide,	0.69 "
Moisture,	14.45 "

Valuation per ton of 2,000 pounds.

12.8	pounds of soluble phosphoric acid,	$1 60
304.2	" of insoluble " "	18 25
13.8	" of potassium oxide,	1 04
46.6	" of nitrogen,	9 79
		$30 68

III.—SEA-FOWL GUANO OF MESSRS. WM. L. BRADLEY & CO.

(Collected of Messrs. Bagg & Batchelder, Springfield, Mass.)

Total phosphoric acid,	15.33	per cent.
Soluble " "	8.04	"
Reduced " "	1.90	"
Insoluble " "	5.39	"
Nitrogen,	2.69	"
Potassium oxide,	2.23	"
Moisture,	19.08	"

Valuation per ton of 2,000 pounds.

160.8	pounds of soluble phosphoric acid,	$20 10
107.8	" of insoluble " "	6 49
38.0	" of reduced " "	3 42
53.8	" of nitrogen,	11 30
44.6	" of potassium oxide,	3 36
		$44 67

IV.—SUPERPHOSPHATE XL OF MESSRS. WM. L. BRADLEY & CO.

(Collected of W. S. Westcott, in Amherst, Mass.)

Total phosphoric acid,	14.50	per cent.
Soluble " "	8.51	"
Reduced " "	1.09	"
Insoluble " "	4.90	"
Nitrogen,	2.50	"
Moisture,	21.16	"

Valuation per ton of 2,000 pounds.

170.20	pounds of soluble phosphoric acid,	$21 27
21.80	" of reduced " "	1 96
98.00	" of insoluble " "	5 88
50.00	" of nitrogen,	10 50
		$39 61

V.—TOBACCO-GROWER OF G. F. WILSON, PROVIDENCE, R. I.

(Collected of Messrs. Bagg & Batchelder, Springfield, Mass.)

Total phosphoric acid,	9.17 per cent.
Soluble " "	6.63 "
Reduced " "	0.26 "
Insoluble " "	2.28 "
Nitrogen,	3.42 "
Potassium oxide,	2.36 "
Moisture,	9.17 "

Valuation per ton of 2,000 pounds.

132.60	pounds of soluble phosphoric acid,	$16 58
5.20	" of reduced " "	47
45.60	" of insoluble " "	2 74
71.82	" of nitrogen,	15 08
47.20	" of potassium oxide,	3 54
		$38 41

VI.—AMMONIATED SUPERPHOSPHATE OF MESSRS. BOSWORTH & BROTHERS.

(Collected of Mr. J. P. Eaton of Auburn, Mass.)

Total phosphoric acid,	8.30 per cent.
Soluble " "	6.85 "
Reduced " "	0.05 "
Insoluble " "	1.20 "
Nitrogen,	1.49 "
Moisture,	7.46 "

Valuation per ton of 2,000 pounds.

137.00	pounds of soluble phosphoric acid,	$17 13
25.00	" of insoluble " "	1 50
29.80	" of nitrogen,	6 25
		$24 88

VII.—PACIFIC GUANO; JOHN M. GLIDDEN, ESQ., BOSTON, MASS.

Total phosphoric acid,	12.99 per cent.
Soluble " "	5.70 "
Reduced " "	0.64 "
Insoluble " "	6.65 "
Nitrogen,	2.34 "
Potassium oxide,	0.35 "
Moisture,	22.78 "

Valuation per ton of 2,000 pounds.

114.00	pounds of soluble phosphoric acid,	$14 25
12.80	" of reduced " "	1 15
133.00	" of insoluble " "	7 98
46.80	" of nitrogen,	9 83
7.00	" of potassium oxide,	43
		$33 54

VIII.—BAY STATE SUPERPHOSPHATE OF J. A. TUCKER, ESQ., BOSTON.

(Collected of Mr. H. A. Parker, East Pepperell, Mass.)

Total phosphoric acid,	14.20 per cent.
Soluble " "	6.50 "
Reduced " "	5.51 "
Insoluble " "	2.19 "
Nitrogen,	2.80 "
Moisture,	17.22 "

Valuation per ton of 2,000 pounds.

130.00	pounds of soluble phosphoric acid,	$16 35
110.20	" of reduced " "	9 92
43.80	" of insoluble " "	2 63
56.00	" of nitrogen,	11 76
		$40 66

IX.—ORIGINAL COE SUPERPHOSPHATE OF BRADLEY FERTILIZING CO., BOSTON.

(Collected of Mr. A. H. Parker, Pepperell, Mass.)

Total phosphoric acid,	13.70 per cent.
Soluble " "	7.81 "
Reduced " "	0.73 "
Insoluble " "	5.16 "
Nitrogen,	2.11 "
Moisture,	20.37 "

Valuation per ton of 2,000 pounds.

156.20	pounds of soluble phosphoric acid,	$19 53
14.60	" of reduced " "	1 32
103.20	" of insoluble " "	6 19
42.20	" of nitrogen,	8 86
		$35 90

X.—Granite State Superphosphate of Bradley Fertilizing Company.

(Collected of Mr. A. H. Parker, Pepperell, Mass.)

Total phosphoric acid,	14.56	per cent.
Soluble " "	8.64	"
Reduced " "	2.19	"
Insoluble " "	3.73	"
Nitrogen,	2.34	"
Moisture,	19.56	"

Valuation per ton of 2,000 pounds.

172.80	pounds of soluble phosphoric acid,	$21 60
43.80	" of reduced " "	3 95
74.60	" of insoluble " "	4 48
46.80	" of nitrogen,	9 83
		$39 86

XI.—Superphosphate XL of Messrs. Wm. L. Bradley & Co.

(Collected of Messrs. Parker & Gannett, Boston, Mass.)

Total phosphoric acid,	12.58	per cent.
Soluble " "	7.62	"
Reduced " "	0.46	"
Insoluble " "	4.50	"
Nitrogen,	3.15	"
Moisture,	25.00	"

Valuation per ton of 2,000 pounds.

152.40	pounds of soluble phosphoric acid,	$19 05
9.20	" of reduced " "	83
90.00	" of insoluble " "	5 40
63.00	" of nitrogen,	13 23
		$38 51

XII.—Cumberland Company's Superphosphate, Portland, Me.

(Collected of Messrs. Arms & Co., Greenfield, Mass.)

Total phosphoric acid,	14.15	per cent.
Soluble " "	4.87	"
Reduced " "	3.08	"
Insoluble " "	6.20	"
Nitrogen,	2.45	"
Moisture,	23.02	"

Valuation per ton of 2,000 pounds.

97.40 pounds of soluble phosphoric acid,	$9 98
61.60 " of reduced " "	5 55
124.00 " of insoluble " "	7 44
49.00 " of nitrogen,	10 29
	$33 26

XIII.—ENOCH COE'S SUPERPHOSPHATE.

(Collected of Messrs. Arms & Co., Greenfield, Mass.)

Total phosphoric acid,	11.02 per cent.
Soluble " "	8.32 "
Reduced " "	0.19 "
Insoluble " "	2.51 "
Nitrogen,	3.11 "
Moisture,	21.93 "

Valuation per ton of 2,000 pounds.

166.40 pounds of soluble phosphoric acid,	$20 90
3.80 " of reduced " "	35
50.20 " of insoluble " "	3 02
62.20 " of nitrogen,	13 07
	$37 34

XIV.—RUSSEL COE'S SUPERPHOSPHATE.

(Collected of Messrs. Belcher & Whittemore, Boston, Mass.)

Total phosphoric acid,	9.80 per cent.
Soluble " "	8.51 "
Reduced " "	0.97 "
Insoluble " "	0.32 "
Nitrogen,	2.06 "
Moisture,	30.08 "

Valuation per ton of 2,000 pounds.

170.20 pounds of soluble phosphoric acid,	$21 27
19.40 " of reduced " "	1 75
6.40 " of insoluble " "	39
41.20 " of nitrogen,	8 66
	$32 07

XV.—STOCKBRIDGE FERTILIZER FOR CORN. MANUFACTURED BY MESSRS. W. H. BOWKER & CO., BOSTON.

(Collected of Mr. W. S. Westcott of Amherst, Mass.)

	Found.	Represented.
Soluble phosphoric acid,	2.56 per cent.	2 to 4 per cent.
Reduced " "	1.60 "	–
Insoluble " "	1.24 "	–
Nitrogen,	7.88 "	6 to 8 per cent.
Potassium oxide,	9.75 "	6 to 8 "
Moisture,	13.65 "	–

Valuation per ton of 2,000 pounds.

51.20	pounds of soluble phosphoric acid,	$6 40
32.00	" of reduced " "	2 88
24.80	" of insoluble " "	1 49
157.60	" of nitrogen,	33 10
195.00	" of potassium oxide,	14 63
		$58 50

XVI.—STOCKBRIDGE FERTILIZER FOR BEETS. MANUFACTURED BY MESSRS. W. H. BOWKER & CO.

(Collected of Mr. W. S. Westcott of Amherst, Mass.)

	Found.	Represented.
Soluble phosphoric acid,	1.6 per cent.	2 to 4 per cent.
Reduced " "	1.0 "	–
Insoluble " "	1.3 "	–
Nitrogen,	6.35 "	5 to 7 per cent.
Potassium oxide,	13.15 "	12 to 15 "
Moisture,	16.93 "	–

Valuation per ton of 2,000 pounds.

32.00	pounds of soluble phosphoric acid,	$4 00
20.00	" of reduced " "	1 80
26.00	" of insoluble " "	1 56
127.00	" of nitrogen,	26 67
263.00	" of potassium oxide,	19 73
		$53 76

XVII.—Stockbridge Fertilizer for Onions. Manufactured by Messrs. W. H. Bowker & Co., Boston, Mass.

(Collected of Mr. W. S. Westcott, Amherst, Mass.)

	Found.	Represented.
Soluble phosphoric acid, ...	2.98 per cent.	2 to 3 per cent.
Reduced " "	1.83 "	–
Insoluble " "	0.29 "	–
Nitrogen, ...	7.36 "	5 to 7 per cent.
Potassium oxide, ...	8.33 "	4 to 6 per cent.
Moisture, ...	13.31 "	–

Valuation per ton of 2,000 pounds.

59.60	pounds of soluble phosphoric acid, ...	$7 45
36.60	" of reduced " "	3 30
5.80	" of insoluble " "	34
147.20	" of nitrogen, ...	30 92
166.60	" of potassium oxide, ...	12 45
		$54 46

ESSENTIAL CONSTITUENTS.	Total Phosphoric Acid.	Soluble Phosphoric Acid.	Reduced Phosphoric Acid.	Insol'ble Phosphoric Acid.	Total Nitrogen.	Potassium Oxide.	Moisture (at 100°-110°, C.)	Valuation per ton of 2,000 pounds.
I. Ammoniated Superphosphate; Messrs. Oscar Foote & Co., Boston, .	11.93	6.17	4.69	1.07	1.48	–	33.48	$31 37
II. Pure Combined Guano; Messrs. Williams & Haven, New London, Conn., ...	15.85	0.64	–	15.21	2.33	0.69	14.45	30 68
III. Sea-Fowl Guano; Messrs. Wm. L. Bradley & Co., Boston, ...	15.33	8.04	1.90	5.39	2.69	2.23	19.08	44 67
IV. Messrs. Wm. L. Bradley & Co. (XL), . .	14.50	8.51	1.09	4.90	2.50	–	21.16	39 61

ESSENTIAL CONSTITUENTS.	Total Phosphoric Acid.	Soluble Phosphoric Acid.	Reduced Phosphoric Acid.	Insol'ble Phosphoric Acid.	Total Nitrogen.	Potassium Oxide.	Moisture (at 100°-110°, C.)	Valuation per ton of 2,000 pounds.
V. G. F. Wilson's Tobacco Grower, . . .	9.17	6.63	0.26	2.28	3.42	2.36	9.17	$38 41
VI. Ammoniated Superphosphate; Messrs. Bosworth & Brother, Putnam, Conn., . . .	8.30	6.85	0.05	1.20	1.49	–	7.46	24 88
VII. Pacific Guano; Pacific Guano Co., Boston, .	12.99	5.70	0.64	6.64	2.34	0.35	22.78	33 54
VIII. Bay State Superphosphate; J. A. Tucker, Boston, ...	14.20	6.50	5.51	2.19	2.80	–	17.22	40 66
IX. Original Coe Superphosphate; Bradley Fertilizing Co., Boston, .	13.70	7.81	0.73	5.16	2.11	–	20.37	35 90
X. Granite State Superphosphate; Bradley Fertilizing Co., Boston, .	14.56	8.64	2.19	3.73	2.34	–	19.56	39 86
XI. Wm. L. Bradley's XL Superphosphate, . .	12.58	7.62	0.46	4.50	3.15	–	25.00	38 51
XII. Cumberland Co. Superphosphate, Portland, Me., ...	14.15	4.87	3.08	6.20	2.45	–	23.02	33 26
XIII. Enoch Coe's Superphosphate, ...	11.02	8.32	0.19	2.51	3.11	–	21.93	37 34
XIV. Russel Coe's Superphosphate, ...	9.80	8.51	0.97	0.32	2.06	–	30.08	32 07
XV. Stockbridge's Corn Fertilizer; Messrs. W. H. Bowker & Co., Boston,	6.40	2.56	1.60	1.24	7.88	9.75	13.65	58 50
XVI. Stockbridge's Beet Fertilizer; Messrs. W. H. Bowker & Co., Boston,	3.90	1.60	1.00	1.30	6.35	13.15	16.93	53 76
XVII. Stockbridge's Onion Fertilizer; Messrs. W. H. Bowker & Co., Boston,	5.11	2.98	1.83	0.29	7.36	8.33	13.31	54 46

The valuation of this class of fertilizers, as above carried out, is based on the supposition that their essential ingredients are present in equally efficient condition. While there can be no doubt about the correctness of this view, as far as the soluble and reduced phosphoric acid is concerned, it must be conceded that the assumption, with regard to the source of nitrogen, and in particular that of the insoluble phosphoric acid, becomes somewhat arbitrary. In sight of the practical difficulties of discriminating more satisfactorily in each individual case, it seems to be safest not to buy superphosphates which contain more than 2 per cent. of insoluble phosphoric acid, and also those which contain a larger quantity of animal matter like hair, skin parts, pieces of horn, etc. The prices adopted in the above calculation are the following ruling market prices of the past year:—

Soluble phosphoric acid, per pound, ...	12.5	cents.
Reduced phosphoric acid, per pound, ...	9.0	"
Insoluble phosphoric acid (of bones), per pound, ...	6.0	"
Nitrogen (of meat, blood, fish, guano, etc.), per pound, .	21.0	"
Potassium oxide (kainit), per pound, ...	7.5	"

The mechanical condition of most of the samples tested was very satisfactory as compared with former years. Although the chemical composition of some of the leading brands of the ammoniated superphosphates has been improved of late, it is a matter of regret that the change for the better is not more general; the value of some is still greatly impaired by a large percentage of insoluble phosphoric acid in some instances, and by an objectionable excess of moisture in others. As long as these conditions exist, it becomes of the utmost importance that farmers should always buy with a definite guarantee of composition. The law for the regulation imposes upon all fertilizer dealers the duty to state on each package the quantity of the essential constituents of the article it contains. There is no redress for losses suffered, except the sales are made with reference to articles of a specified composition.

The above-stated values refer to the retail price, which the various articles may claim, at the storehouse of the manufacturer, without charges for transportation. A recent consultation with Professor W. O. Atwater, director of the Connecticut Experimental Station at Middletown, has convinced me that they express fairly the ruling market values, not only of Massachusetts, but also of the adjoining States, during the past years.

FISH AND FISH GUANO.

The following statement regarding the condition of the fish fertilizer trade has been kindly furnished by H. L. Dudley, Esq., Secretary of the United States Menhaden Oil and Guano Association: "The total amount of fish guano made in the season of 1876 was 54,650 tons. This represents the crude fish scrap; but a larger proportion was dried than in any previous season. The demand from manufacturers and consumers each year is increasing for dried material. The amount of scrap now on hand is 4,275 tons, not including about 3,000 tons in Maine, which is being dried for export." It is gratifying to learn from this communication that the consumption of fish refuse is rather increasing than decreasing as compared with previous years. As a nitrogenous phosphate, it is second to none of our home-made fertilizers, if properly applied. The only objection which can be raised against its use, in many instances, still is due to its inferior mechanical condition and its varying state of moisture. Farmers ought to buy none but those articles which are guaranteed to contain a specified amount of nitrogen and phosphoric acid, and are well ground.

CHARLES A. GOESSMANN,
State Inspector of Commercial Fertilizers.

AMHERST, MASS., February 1, 1877.

APPENDIX.

Composition of some Compounds in Fertilizers.

100 parts of nitric acid contain 26 parts nitrogen.
“ of ammonia “ 82.35 “ “
“ of nitrate of potassa contain 46.6 parts potassium oxide.
“ “ “ (or saltpetre) contain 53.4 parts nitric acid.
“ of nitrate of soda contain 36.75 parts sodium oxide.
“ “ “ (Chili saltpetre) contain 63.25 parts nitric acid.
“ of sulphate of potassa contain 54.9 parts potassum oxide.
“ “ “ “ 46.0 parts sulphuric acid.
“ of sulphate of lime (free of water) contain 41.0 parts calcium oxide (lime).
“ of sulphate of lime (free of water) contain 59 parts sulphuric acid.
“ of sulphate of lime (with water, gypsum) contain 32.5 parts calcium oxide (lime).
“ of sulphate of lime (with water, gypsum) contain 46.5 parts sulphuric acid.
“ of sulphate of lime (with water, gypsum) contain 21 parts water.
“ of bone phosphate (or tricalcic phosphate) contain 54 parts calcium oxide (lime).
“ of bone phosphate (or tricalcic phosphate) contain 46 parts phosphoric acid.
“ of carbonate of lime contain 56 parts calcium oxide (lime).
“ “ “ “ 44 parts carbonic oxide.
“ of chloride of potassium contain 52.4 parts potassium.
“ “ “ “ 63.1 parts potassium oxide.
“ “ “ “ 47.6 parts chlorine.

Voted, That the laws relating to the agricultural societies be printed in connection with the Secretary's Report.

The legislative Committee on Agriculture were invited to appear in conference with the Board. The chairman of that committee, Hon. James J. H. Gregory, stated the several points on which the committee would like the opinion of the State Board of Agriculture. The various subjects presented were fully discussed and acted upon by the Board, when the committee withdrew.

Voted, That the Board approve of the application of the Trustees of the Agricultural College for aid from the Legislature.

Voted, That the Committee on Printing of last year be continued.

Voted, That any delegate who may be unable to attend the exhibition to which he is assigned, be requested to notify the Secretary in season to arrange for a substitute.

Mr. HADWEN, chairman of the Committee of Arrangements, presented the following report:—

THE EXHIBITION AT WORCESTER.

The invitation of the Board of Agriculture having been extended to all, to exhibit at the country meeting of the Board the products of the farm, garden and orchard, brought out a large and select contribution of fruits, vegetables, flowers, and trees and plants for ornamental use.

This being the first exhibition held under the auspices of the Board, and contributed by gentlemen who are practically interested in agriculture and horticulture, their generous efforts and intelligent skill and cultivation brought together, from all parts of the State, a display of rare excellence.

No premiums or gratuities were offered or expected. The exhibition was purely a work of love and enthusiasm, to bring together, for comparison and other tests, the best products of the farm and garden.

Ample accommodation for the display was provided by the Worcester County Horticultural Society, which gratuitously placed its Hall of Ceres at the disposal of the Board for the display of fruits and vegetables, cereals, etc. The flowers and conifers were placed on side-tables in the Main Hall of Pomona, where the meeting was held, and they proved an attractive and pleasing feature.

Mr. William C. Strong of Brighton Nurseries contributed twenty-five varieties of evergreens in pots. Among them were many new and rare plants from Japan. The display was the most interesting of its kind ever seen in the halls of the Society.

Captain John B. Moore of Concord had a rare and interesting display of cut-flowers, which were much admired; and the exhibition, in its several features, proved very attractive to all who attended the meetings.

The Committee deem it impracticable to particularize the merits of the many contributions, but will mention some displayed on the tables as follows:—

To the exhibition of apples was contributed,—

By C. L. Hartshorn of Worcester: The Danvers Sweet, Old Nonsuch, Talman Sweet and Northern Spy.

By Newell Wood of Millbury: The Lovell, Yellow Bellflower, Northern Spy, Peck's Pleasant, Roxbury Russet, Red Russet, Stockwell Winter Sweet, King of Tompkins County, Fameuse, Hubbardston Nonsuch and Baldwin.

By E. B. Rice of Worcester: Gillyflower, Sweet Russet, Fallawater, Blue Pearmain, Baldwin, Rhode Island Greening, Roxbury Russet, Grafton Sweeting and Red Stripe.

By J. F. Allen of Worcester: A seedling of the Northern Spy, and the Newark Pippin.

By O. B. Hadwen of Worcester: the Baldwin, Vandervere, Æsopus Spitzenberg, Ladies' Sweeting, McClellan, Hubbardston Nonsuch, Bailey's Sweeting, Sutton Beauty, King of Tompkins County, Cogswell, Jewett's Fine Red, Twenty Ounce, Smoke-house, Northern Spy, Mother, Sheppard's Sweeting, Leicester Winter Sweeting, Yellow Bellflower, Holden Pippin, Washington Royal, Rhode Island Greening, Roxbury Russet, Hunt Russet and Old Nonsuch.

By Mrs. G. A. Chamberlin of Worcester: The Gloria Mundi, Yellow Bellflower Sweet, Northern Spy and Old Nonsuch.

By John B. Moore of Concord: Hubbardston Nonsuch.

By B. P. Ware of Marblehead: The Pickman Pippen and Drap d'Or.

By H. C. Sargent of Worcester: The Yellow Bellflower, Hubbardston Nonsuch, Liscomb and Mother.

By William Eames of Worcester: The Northern Spy, Yellow Bellflower, Hubbardston Nonsuch, Mother and King of Tompkins County.

By George S. Coe of Shrewsbury: The Winter Sweet, American Beauty, Red Russet, and English Golden Russet.

By T. S. Gold, West Cornwall, Ct.: Hubbardston Nonsuch, Burnham Sweet, Excel and Hurlburt.

By J. F. Brown of Lunenburg: Apples for name, very fine.

By Sylvanus Sears of Worcester: The Hubbardston Nonsuch, Gravenstein, Æsopus Spitzenberg, Northern Spy, Royal, Blue Pearmain, Westfield Seek-no-further, Baldwin, Pound Sweeting, Fall Harvey and Mother.

By C. T. Foster of Holden: The Sweet Russet, Gloria Mundi, Mother, Northern Spy, Holden Pippen, Liscomb and Fameuse.

By Asa Clement of Dracut: The Mother, Talman Sweet, President, Nod Head, Maiden's Blush, Gravenstein, Roxbury Russet, Baldwin, Danvers Winter Sweet, Lyscomb, Canada Russet, Cogswell, Fallawater, Hubbardston Nonsuch, American Eagle, King of Tompkins County, Northern Spy, Twenty Ounce, Foster Sweet, Holden Pippin, Ladies' Sweet and Yellow Bellflower.

Of pears, the lateness of the season prevented a large exhibition, but those shown were finely grown.

E. W. Lincoln of Worcester exhibited Josephine de Malines and Winter Nelis.

John B. Moore of Concord had specimens of Beurre d'Anjou, Le Curé, Urbaniste, Beurre Diel, Beurre Langlier and Lawrence.

Stephen S. Foster of Worcester showed Doyenne de Commice, Winter Nelis, Glout Morceau, Beurre d'Anjou, Dix, Lawrence, and three sorts unnamed.

Loren Coes of Worcester exhibited Doyenne de Commice and Duchess d'Angoulème.

O. B. Hadwen of Worcester had Vicar of Winkfield, Beurre Gris d'Hiver, Duc de Brabant, Lawrence, Beurre d'Anjou and Onondaga.

Among the contributors of vegetables,—

Benjamin P. Ware of Marblehead had Boston Marrow Squash, Turban Squash, Hubbard Squash, Danvers Onions, Mangolds, Norbiton's Giant, Intermediate Carrot, Improved Savoy Cabbage, and Stone Mason.

J. B. Moore of Concord exhibited Weathersfield Red Onions, Danvers Yellow, White Portugal, Turban Squash, Early Vermont Potatoes, White Winter Wheat, Field Corn, two traces, and early Concord Sweet Corn.

Sylvanus Sears of Worcester had specimens of Intermediate Carrot, Yellow Ruta-baga Turnip, Shamrock, Swede, and R. I. Premium Corn.

Wm. J. Ross of West Boylston exhibited Prolific Corn, twelve ears from one seed.

N. S. Walker of Oakham exhibited Java Wheat, Belgium Oats, Field Corn, Short-horn Carrot, two traces, and Cracker Onions.

Sturtevant Bros. of Framingham presented Waushakum Corn, eight rows.

Thomas A. Dawson of Worcester exhibited Short-horn Carrots, Orange Jelly Turnips, Corn, five ears to the stalk.

S. W. Howe of Shrewsbury had Field Corn, Sweet Corn, and two-rowed Barley.

H. C. Sargent of Worcester exhibited Field Corn, Vegetables and Cereals.

S. Reed of Shrewsbury exhibited Western Dent Corn, twenty rows.

George Hill of Arlington had four roots Boston Celery.

F. J. Kinney of Worcester had three Marblehead Squashes.

J. W. Pierce of Worcester exhibited three Hubbard and three Butman Squashes.

D. Dwight of Dudley had Field Corn, R. I. White.

Joseph S. Perry of Worcester exhibited three Cabbages, Mangolds, English Turnips, Swedes, and Carrots.

Joab Hapgood of Shrewsbury had Field Corn, eight-rowed.

J. P. Eaton of Auburn exhibited Field Corn.

George H. Rice of Worcester had specimens of Citron.

For the Committee,

O. B. Hadwen, *Chairman.*

The report was accepted.

Mr. Vincent presented the following essay upon—

ART AND AGRICULTURE—THEIR RELATIONS TO EACH OTHER.

A false notion has gained possession of many minds in regard to the respectability of the farmer's occupation, especially as relates to the actual work of tilling the soil. We say it is a false notion, for farming is a heaven-originated employment, just that to which man by his constitution was adapted and that to the pursuit of which he was directed. So, not only Adam was a farmer, but also Cain and Abel, his sons; the latter, it would seem, in the stock-raising department, and the former in the real cultivation of the ground. And thus, as the world progressed, agriculture in its varied forms became the chief employment, and, we think it legitimate to conclude, the most ennobling to which mankind could have been assigned.

While in tropical regions almost all needful plants and fruits grow spontaneously or with comparatively little care, in the temperate and colder climates the chief peaceful avocation of men has been that of agriculture. As evidence of this, we find in the Book of books frequent reference to acts and scenes in husbandry. The Psalmist speaks of "the handful of corn in the earth upon the top of the mountain," the fruit whereof should "shake like Lebanon." In one of the parables of the Great Teacher, it was said of the seeds sown, that "some seed fell by the way-side, . . . some fell upon stony places, . . . and some fell among thorns; . . . but other fell into good ground." One speaks of "the earth which drinketh in the rain that cometh upon it, and bringeth forth herbs meet for them by whom it is dressed." Another says, "And strangers shall stand and feed your flocks, and the sons of the alien shall be your ploughmen and your vine-dressers." And another, "First the blade, then the ear, then the full corn in the ear." It is announced, "And I will send grass in thy fields for thy cattle." Again, "For thou shalt eat the labor of thy hands." Yet again, "And Joseph gathered corn, as the sand of the sea, very much, until he left numbering."

Such are a few of the many declarations and sayings in sacred history. Elsewhere we find corroborative references in abundance. Historians have written and poets have sung the praises of agriculture. Chief among the latter in the olden time were Theocritus of the Greeks and Virgil among the Romans. Much of their writings related to the tending of flocks and herds; but the "Georgics," as the word indicates, dwell upon the cultivation of the soil.

Through all ages agriculture has been relied upon for sustenance, and some of the noblest minds have been engaged in the furtherance of its work. Its progress in this country during the last century has been most ably sketched, as we all well recollect, by the worthy Secretary of this Board, as printed in the state report for the year 1873–4.

The relative importance of agriculture as it stands in the list of the greatest industries of the world was truly rated (as often quoted) by the great statesman, Daniel Webster, when he placed it above both manufactures and commerce. For what could others do without this? And this reference leads us to one of the topics intended, the relations which art and agriculture bear to each other.

First, to follow out the above comparison, without agriculture, and that on a large scale, we could have but little commerce (which implies art as well as trade), both because it supplies many articles for transportation, and because most of the material for the construction of ships and cars—the great carriers—must be supplied from the forests of the farmer. On the other hand, it is true, the farmer is dependent upon these means of transportation to get the ordinary products of his land to a market. And so while the arts of ship-building and car and cart making are of the highest importance in their relations to agriculture and the community, the farmer not only supplies freight for these carriers, but also food for the merchants and men who by their money and muscle construct them, and the same for both those who navigate and work the water-craft, and those who run the land conveyance, whether on road or rail.

So of the manufactures. While the farmer is dependent upon the manufacturers' arts for the cloth he needs to wear, and to sundry other arts for the articles needful for domestic use, the artisans who furnish him with these things are dependent on the cotton and wool growers, and the forest and mineral land holders, as the case may be, not only for the raw material to run through their varied processes, but, as in the other case, for the cereals, roots, bulbs, and meats on which to subsist, and wood and coal to carry on the arts of cooking for them the year round, and to keep them warm in winter.

So we may say of the arts and mechanisms which furnish the very implements of husbandry, on the one hand, and the rural supplies needful for cunning workmen, on the other. The exercise of the arts and trades which provide axes, hoes, shovels, forks, ploughs and harrows, mowing-machines and raking-machines, and other needful implements of husbandry, is indeed indispensable in this age, particularly in these higher latitudes, to the successful processes of agriculture; while the artisan and mechanic, whether the master workman or the journeyman, but for the farmer who both pays them for their wares and sells them his produce, would be minus their bread, butter, beef, and cheese, so needful for the inner man, to say nothing of wool and hides to be converted into clothing and shoes for the covering of their households. Much more might be added here, in following out the detail—dress, travel, pleasure, education, attending cattle-shows, etc., all come in.

But we pass to notice briefly another of the arts as related, interchangeably, to agriculture; namely, the art of printing. The writings of ancient times on such material as was then at hand,—prepared animals' skins and barks of certain trees,—and the hieroglyphics and other inscriptions on walls, metals, and rocks, although a slow and imperfect way of disseminating light and truth, were, for the transmission of historic facts, great improvements on mere oral traditions. But the art of printing, a discovery of the Middle Ages, was the morning star throwing out its mellow light at the dawn of a brighter historic day. The growth of this art to a state of comparative perfection, and the increased power of its machinery and appliances, have been truly wonderful. The mammoth presses and binderies now send forth papers and books, scattering them like the leaves of autumn over lands civilized, and over parts of heathendom. Works treating of other arts, of the sciences, of religious topics, and those merely literary, are in almost countless numbers of copies wafted to the homes of the millions. The art of writing precedes, and necessarily supplies matter for this. The art of printing has thus enlisted the contributions and coöperation of the brightest geniuses of the modern ages. Poets have sung for it, divines, statesmen, orators, and literary persons generally, have furnished material for it to work upon, and colleges and seminaries of learning have developed minds to cater to its demands. It sheds its benign light upon peasant as well as prince, and its advertisements of the products of the farm are far more influential than are those of all other means.

This art so inspired the genius of Benjamin Franklin as to prepare him for those great discoveries in science which have since associated his name with the names of Sir Isaac Newton and Robert Fulton, and for those views and reflections on political economy which have placed him in history by the side of a Solon, a Lycurgus, and a Napoleon Bonaparte. And this same art is doing quite as important a work in these later times, by aiding such minds as those of Agassiz and Goessmann in the detection of those forces in nature which are to assist agricultural operations to a degree unknown before, while the toiling millions will be guarded against impositions, such as those to which, in quite too many cases, they have been subjected. Public addresses have, it is true, been useful in this work, and will doubtless still be so; but the press is the great power through which such minds are making the nobler achievements in the agricultural as well as in other interests.

On the other hand, agriculturists supply not only the material on which, when prepared, those "words that burn" are printed, but also the means of subsistence, and the material for apparel to the many tens of thousands, both of those who provide, and those who work the machinery, as well as those who finger the type. Thus, while one does not live alone and without the other, but the doings of each contribute to the needs and profit of all others, interchangeably, the yields of the farm constitute the real *sine qua non*, that without which nothing can be done.

So of other arts, including those which result from discovery, as that of steam-power; now, indeed, the great power utilized by the printer as well as by others. Agriculture itself is an art, which, aided as it is in its processes by science, contributes in multitudinous ways to its own development, furtherance and growth, as well as to remuneration. And therefore, whatever tends to the cultivation of and improvement in this art,—such as the organization of agricultural societies, the constituting of state boards of agriculture, the founding and supporting of agricultural colleges, and especially the annual society, state and national reports, which are the mouthpieces of all our doings,—all this is bringing wealth to the body politic, as well as substance to the farmers themselves, the laborers, the mechanics and the tradesmen of the Commonwealth and of the country at large.

Nor should horticulture be forgotten here, for it is linked with agriculture, like one Siamese twin to the other. It is the *Cultura Agris* as truly as the other, only it is usually worked on smaller lots. It was first practised in the Garden of Eden. It was prosecuted on the hanging gardens of Babylon, and has flourished more or less in all lands where enlightened husbandry has been prominent; but in no time probably to so great and useful an extent as within the last century. In the published Transactions of the Massachusetts Horticultural Society, printed in the year 1852, is an historical sketch of that society, written in 1850, by Gen. H. A. S. Dearborn, its first president. In that sketch is the following paragraph:—

"The science and art of horticulture, even in the oldest and most enlightened nations of Europe, had not claimed that earnest attention to which they were eminently entitled before the middle of the last century; and it was not until the commencement of the present that a zealous spirit of inquiry was excited and efficient measures adopted for accelerating their development by accurate experiments in a manner commensurate with that which had been realized in all the other great branches of industry."

And here we think it fitting to add that, while horticulture is the handmaid of agriculture, and with it is very influential in its interchanges with other arts and trades, to no man do we owe more for the perfecting and consequent usefulness of this department here in Massachusetts—unless, possibly, it may have been to Gen. Dearborn himself—than to the honored member of this Board, Col. Marshall P. Wilder.

And here, too, we may add, as elsewhere intimated, that agriculture operates interchangeably with all the arts and industries, and that we think we may truthfully say it is the basis of support to them all, not excepting the fine or liberal arts. For while the poets, like Homer and Virgil of the ancients, and Scott, Burns, Young, Tennyson, Longfellow, and numerous other of the moderns, have been composing their immortal verse, the bronzed-faced yeomanry have been at work in the vineyard or in the field, producing food, not only for themselves, but for the multitude of admiring ones whose long hours and days are beguiled and charmed by their works. So of another class. Beethoven, Handel, Hastings, Mason and others practised their enchanting art (for music is an art as well as a science) to the delight of the multitudes, many of whom lived by the sweat of their faces, and rendered back freely of the fruits of their hard toil to these masters of song. While Phidias and Powers are plying the chisel, bringing out of the unseemly block of granite or marble the beautiful εικων (image), the practical farmer is toiling on in part to raise the means with which to pay for the sight-seeing, or, perchance, to purchase the polished form. And while a Raphael, a Michael Angelo, or a West sits at his easel putting the delicate touches of his brush upon a most beautiful work of art, the farmer is delving in the field to feed the artist, and it may be to adorn his cottage with some of the productions of his genius. So, in like manner, is reciprocated the work of the master and his men who place in and upon otherwise plain structures, the ornamental in architecture.

It seems appropriate in this place to consider agriculture briefly with respect to its relative importance as a *producer*. There are many departments of business which are not producers at all in the proper sense of the term, and there are many arts that are producers, but in a different sense from that of agriculture, and ordinarily in a much less degree than this. As to the first, it may be said that the person who sells a lady's dress, or a chest of tea, and even he who sells a house or a farm, does not produce anything; the articles merely change hands, and so does the money: there is no more of the one or the other than before. So a merchant loads his ship with goods and sends her to a foreign port, where the cargo is disposed of, and payment made either in goods in exchange or in money at an advance upon the cost here. Nothing really is produced by the operation; there are no more of the goods, if exchanged, on either side, or, if paid for in money, there is no more of that than before. Things have merely changed hands. These are not arts, but simply transactions in certain business occupations. Real arts do produce something to which a value is attached, and they thus have a relative importance as producers. A man who makes an axe-handle or a boat's oar utilizes the wood which he either purchased or received as a gift from some one who probably obtained it of the landholder. The ship-builder and the housewright do a similar thing on a larger scale. So the men who work in mints utilize the valuable ores drawn by other hands from the mines, the river's brink or the quartz beds. But the farmer grows corn and fruit where nothing like corn or fruit existed before, with the exception of the germinating and fertilizing elements as they existed uncombined in the soil and in the atmosphere.

The artist who paints a peach or a pear is dependent on the grower for the original, and but for which he could not have made the resemblance. So when he paints the flower or the cluster of flowers. He does not make the original, and but for the florist many of the most valuable kinds he never could have to imitate. Indeed, for the beautiful landscape scene which he pencils or paints, he is in great measure indebted to the hand of cultivation. And let no one imagine that these remarks are inappropriate in this connection, for the floral families are all grown from the same kind of soil as the root and the grain.

And here, again, looking at the high degree of importance which we accord to agriculture among the producers of the world, we are to keep in mind that its forces do not come altogether of themselves, nor do they mature at once. The truth is far from either of these ideals. Agriculture has its small beginnings and is a thing of progress, just as truly as anything in nature or in art. As the child, physically, grows to the proportions of a man, and as in mind there is the intellectual bud, flower, and fruitage, in order to a ripe manhood, so in the processes of agriculture the desired end is not reached all at once. The bulb, the seed, or the cutting must be put into the ground, and the tender plant, spire, or shoot nurtured, before it can become a mature plant, stalk, or tree. In the field, the ground must be ploughed, its surface pulverized, the seed sown or planted, and the hills cultivated, or the harvest will never be gathered. And still, the faint-hearted look upon the soil of New England, and say, How can we succeed here? Answer, first: The harder the soil the better, it may be, for both mind and muscle. And secondly: What unaided labor cannot accomplish, science and art come in to assist in doing. The time is come when the helpers of the soil in the production of grasses and grains, and of plants in general, are more than ever in the past, coming to be known and appreciated. The abattoirs and the compost heaps are doing much. Then the strong, educated minds are at work for us. One by patient investigation tells us of the powers and processes in the germination and growth of plants; and by long-continued and persistent experimenting, he demonstrates the functions of roots and rootlets, and the periodical upward and downward flow of sap, and thus the laws of tree-growth. Another tells us, specifically, what elements and in what chemical proportions, compounds or mixtures must be made in order that nature may respond to our requests the most liberally in crops. Another analyzes soils and fertilizers, and thus aids improvements on waste lands, and protects the farmers against imposition. And yet another instructs us in all that conduces or appertains to success in the dairy. Thus on to the end of the column.

Having thus briefly, and it may be imperfectly, sketched the relations subsisting between art and agriculture, and thereby shown, in a measure, the relative importance of the latter, and its great consequence among the industries of mankind, we shall be richly repaid for the attempt, if we shall have induced any one to place a higher and more adequate estimate upon it as a life-work, and shall thus, in any measure, have encouraged the intelligent cultivation of the soil.

Hebron Vincent.

President Chadbourne stated that he wished to say a word in addition to what was said at the public meeting at Worcester in reference to—

THE COLORADO BEETLE (*Potato-Bug*).

Experience is the best teacher in dealing with this pest, as in other matters. And experience has demonstrated the decided success of hand-picking. To those who have seen the armies of bugs on neglected potato-fields, or have heard of their immense numbers and know nothing definitely of the habits of the bug, hand-picking would seem like an attempt to bail out the ocean with a bucket. But the bugs are large insects, and can be readily seen; and they never attempt to escape from you. In the spring they are comparatively few in number, and they make their way promptly to the first potatoes that appear, so that by concerted action of the potato-growers of a neighborhood, in planting a few early potatoes in every field which is to be used for producing a late crop, and destroying the bugs as they congregate on these early vines, a very large proportion of the bugs can be destroyed before any eggs are laid. It will be a light job then to clear the field of the first crop of bugs. If any broods hatch, their presence can be detected at once, and the leaves and larvæ be removed together. A boy who understands his business can examine three or four rows each time that he passes through the lot, and by taking the work in season, as I have explained, he can clear a large piece in a day. If the work is done thoroughly, it will be safe to leave the crop for a week at least. It is probably best to pass through it once a week until the tops are fully grown. It was found on the Wisconsin University farm, where the bugs fairly swarmed, that potatoes, rightly cared for, could be protected by hand-picking for less than $5 per acre. I think this can be done in any place.

If the bugs are neglected for a time until the larvæ abound on the vines, then there is no remedy but poison. But if one neglects his field so as to render poison necessary, the work will probably cost him more than the hand-picking would have cost, if rightly applied. Besides, poison must kill some beneficial insects as well as the injurious; and many people object to buying potatoes on which poison has been used. Probably no injury is done to the potato by the poison used upon the vine, but it will be well for the dealer to be able to say that no poison has been near the potatoes he offers for sale.

A man can protect himself in spite of his careless neighbors; but the work is much easier when all act together. One acre of potatoes neglected will raise bugs enough to stock a township. It should be an indictable offence for a man to plant potatoes and then suffer them to become simply a nuisance to his neighbors. He can kill the bugs with poison, if in no other way; and he should be compelled by law to do so, before they scatter in the fall. The accounts we have of such immense multitudes of bugs moving in the fall, simply show that many farmers, discouraged by the multitude of bugs, have given up their crops without a struggle,—have fed a multitude of pests to annoy themselves and other people the succeeding year. It is useless to talk of "starving these bugs out" by planting only early potatoes. They will eat egg-plants, bell-peppers, wild solanums and, when hard pushed, will try the tomato-vines. I have seen them feeding vigorously upon the tender leaves of the mullein and pasture-thistle. Doubtless many other plants help them out when the potato tribe fails. The statement that the full-grown bugs never eat seems strange to one who has seen them eating all the plants here named, and also gnawing away at the potatoes left in the field, especially upon those turned green by exposure to the sun while growing.

It is evidently more advantageous than ever before to raise as many potatoes as possible upon the acre. It will not pay, as formerly, to plant land that will raise only a small crop. Yet it is to be remembered that any manuring that produces very abundant vines, makes more difficult the fight with the bugs. The potatoes should be planted a little farther apart than we are accustomed to plant them, and such manures should be used as will not promote an excessive growth of vines. Finally, to sum up,—

1. Plant a few potatoes in your field as early as possible, and destroy the bugs as they appear on them.
2. For the main crop, plant at good distance between the hills and manure well with ashes or such manures as do not specially promote the growth of vines.
3. Pass through the field, after the potatoes are up, once a week until the time of blossoming, picking all bugs, larvæ and eggs that appear.
4. If for any reason the bugs get beyond the hand-picking, use poison till every bug is destroyed, if not for your own crop, for the benefit of others.
5. As bad as the potato-bug is, remember that no other injurious insect can be more surely kept in subjection and destroyed than it; that those who are determined to raise potatoes can raise them at an extra expense of not over five cents per bushel, in spite of the bugs and their allies, the indolent farmers, who feed them.
6. Do not wait till the second crop of bugs appears, and then try to demonstrate that hand-picking is powerless against such an army; because that is conceded in the beginning, without any waste of words.
7. If you are not determined to kill by hand or poison, every bug that appears on your crop, then do not, as a good neighbor, plant at all.

The several reports of Delegates, and the Essays presented, were read a second time by their titles, and accepted; when the Board adjourned.

It will be recollected that in my report for 1872, the twentieth of the series, I took occasion to controvert the false assertions, based on the United State census of 1870, that the agriculture of this State was declining. Such assertions were made not only by the press of this State, but especially by writers in other parts of the country and abroad, where they were exultantly circulated, very greatly to our injury. They were exerting a very depressing influence upon the farming community,—leading young men to leave the farm under the impression that it was hopeless to link themselves to failure in a pursuit that was fast losing its relative importance among the great industries of the Commonwealth, and where the avenues to prosperity appeared to be rapidly closing up.

In the report referred to, on pp. 7 and 312, I showed conclusively that the census of 1870, the ninth of the series, was not only grossly inaccurate, so far as it applied to Massachusetts, but so mischievously careless and injurious to the interests and reputation of the State as almost to deserve the term fraudulent; and that it did not offer us even an approximation to the truth. I stated that, "So far from there being any reason for circulating the falsehood that there had been any decline, the aggregate value of the farm production of the State has largely increased, even though a few of the old staple crops may have fallen off." And again: "The census of 1850, for example, states the number of farms as 34,069; that of 1860, as 35,601; while that of 1870 gives only 26,500,—a difference of 9,101 farms since 1860. Now, apart from the fact that the same causes were operating to increase the number from 1860 to 1870, as from 1850 to 1860, we know that the selectmen and assessors of taxes in each town are far more likely to be correct than the United States marshals. According to the Statistics of Industry of 1865, the number of farms in the State at that date was 46,904, which would leave the number of farms that were overlooked in gathering the census of 1870 still greater than that stated, or more than 20,000 instead of 9,000."

In the same report it was also stated that, "The large number of farms entirely overlooked in gathering the statistics of the census, vitiated all the agricultural returns of every description. That such is the case appears from the fact that the total number of acres recognized in the census, including woodland and all improved and unimproved land of every kind, is little more than half the actual acreage of the State. The area of the State, for instance, is about five millions of acres, or more accurately, 4,992,000 acres, while the number of acres embraced in the census is only 2,730,283, a discrepancy of over 2,260,000 acres, altogether too large to be accounted for on any other supposition than a failure to find a large number of farms, a fact which appears also plainly enough on a comparison with the official returns of this Commonwealth."

I stated also that "so far as a few items are concerned, we have a still better means of comparison, for the assessors, in May, 1870, returned the number of cows taxed in the State as 161,185, and in May, 1871, as 162,782, while the census of 1870, *taken at the same time*, the different sets of officials often crossing each other's track, returns only 114,771,—a discrepancy of very nearly 50,000, which can be accounted for in no other way than on the supposition that a large number of farms were entirely overlooked. Again, the assessors, in 1870, return the number of horses as 107,198, and in 1871 as 112,782, while the United States census of 1870 returns only 41,039. Now, if it be said, in explanation, that the number given in the census includes only horses kept on farms, it does not help the matter any; for the census states the number of horses *not* on farms as only 45,227, making the total number in the State 86,266 only, still leaving a discrepancy of 26,516 on the large number of farms whose statistics are not included in the census, having been entirely overlooked. Moreover, these gross discrepancies run all through the agricultural productions, as given in the census returns of this Commonwealth."

These facts were stated simply from the figures printed and circulated in this State and all over the country. They were stated without blaming anybody, without even criticising anybody, and without the slightest reference to the superintendent of the census, and simply as a matter of duty to correct the false impressions that had gained currency in all parts of the country, purporting to be based on the census of 1870.

I allude to the subject in this connection, to call attention to the state census of 1875, prepared under the direction of Col. Carroll D. Wright, Chief of the Bureau of Statistics of Labor, which has just been issued, and to say that it completely sustains the position I maintained in the report already alluded to. This state census of 1875, universally admitted to be by far the best planned, the most accurate and the most trustworthy of any ever taken either by the State or by the United States, gives the number of farms in Massachusetts as 44,549! Of this result we know that one thing is certain. The statement as to the number of farms is absolutely correct, in one respect at least—the number is no less than that given. There may be, and probably are, a few more; the amount and value of products, if not correct, are the results of the certified statements of the producers themselves; and, from all the collateral evidence at hand, it is believed that the total amount of farm products, as stated in the volume, does not vary very materially from the positive facts, and the amounts of products stated are, of course, less rather than more than the truth. Here we have abundant evidence that the number of farms is nearly, if not quite, 20,000 greater than that given in the United States census of 1870:—

The total area of the State is . . . . . 4,992,000 acres.

Included in farms, ...	3,402,368	acres.
in lakes and ponds, . .	93,000	"
in rivers, ...	200,000	"
in cities and villages, city and town lots, cemeteries, parish and association lands, etc., . .	550,000	"
in 1,837 miles of railroad, including stations, . .	20,000	"
in 20,000 miles of highways,	140,000	"
in detached and non-resident lands, ...	81,759	"
in reservoirs, . . .	32,367	"
Total, ...	4,519,494	acres.

There is still, it will be seen, a very considerable area not very clearly accounted for. A recapitulation of the State by counties shows that while the total domestic products reached $7,078,004, as stated, the purely agricultural products reached $34,443,795; total domestic and agricultural product of the farms of Massachusetts for the year ending May 1, 1875, $41,521,799. These values are currency; in gold they are, respectively, $6,319,646, $30,753,388, and $37,073,034. In 1865 there were, in gold, domestic products, $3,678,087; agricultural products, $28,349,734—total domestic and agricultural products, $32,027,821; a gain over 1865 of $5,045,213, or nearly 16 per cent.

In agricultural products Worcester County leads the State, returning $6,960,777 worth; Middlesex comes near to Worcester, producing $6,272,089 worth; Hampshire ranks third, $3,066,833; Essex fourth, $2,974,659; Berkshire fifth, $2,794,545; Hampden sixth, $2,774,297; Franklin seventh, $2,593,738; Bristol eighth, $2,411,305; Norfolk ninth, $1,696,338; Plymouth tenth, $1,646,260; Barnstable eleventh, $547,613; Suffolk twelfth, $473,630; Dukes thirteenth, $135,022; Nantucket fourteenth, $96,639.

The details of the statistics show that our agriculture has been changing, a fact that has long been perfectly apparent and which was easy to be accounted for in the rapid increase of the number of manufacturing villages and local markets. The egg and milk products, for example, exhibit wonderful progress, the latter growing from 2,850,412 gallons in 1845 to 35,698,159 gallons in 1875.

But the statistics also show a vast progress in the direction of improved tillage. An examination of the relation of quantities raised to acres tilled convinces one that the farmers of Massachusetts have learned the important lesson of tilling less land and tilling it better, for we find that even in the crops where loss in the aggregate occurs there has been a great improvement in results. In 1855 it took 4,971½ acres to produce 99,430 bushels of barley; and in 1865, 7,103¾ acres to produce 138,524 bushels; while in 1875 it took but 1,828⅜ acres to produce 46,884 bushels; an increase in the average yield from 20 bushels to 25½ bushels to the acre. The beet crop increased from 193½ to 244⅝ bushels per acre from 1865 to 1875. The product of corn per acre grew from 28¾ bushels in 1865 to 35¾ bushels in 1875. Onions, an important product, made an increase in quantity per acre, and the average yield of oats per acre increased from 21⅛ bushels in 1855 to 31¼ bushels in 1875; and potatoes from 91 bushels per acre in 1865 to 108 in 1875, and wheat from 15¾ in 1855 to 20⅓ in 1875.

Some of the more important tables are presented in the Appendix to the second part of this Report, to which reference is respectfully made. I can do little more in this connection than to call attention to a few of the leading features of the census, and to suggest that the official returns are worthy of careful study on the part of all who wish to become familiar with the present condition of our agriculture.

Under the head of farm property, the following table is given, showing the number of farms, their acreage, average acreage, total value and average value, by counties :—

COUNTIES.	Number of farms.	Total acreage in farms.	Average acreage in farms.	Total value of farms (land and buildings).	Average value of farms.
THE STATE,	44,549	3,402,368⅞	76	$182,663,140	$4,100
Barnstable,	721	59,914	83	1,615,418	2,240
Berkshire,	3,791	470,594	124	15,073,948	3,976
Bristol,	3,570	217,368	61	11,881,683	3,328
Dukes,	371	33,945	91	678,890	1,830
Essex,	3,282	179,683¼	55	14,213,235	4,331
Franklin,	3,956	350,443⅜	88	11,352,503	2,870
Hampden,	3,736	316,015¼	85	14,496,445	3,880
Hampshire,	3,666	316,991½	86	12,260,330	3,344
Middlesex,	6,085	362,945½	60	36,375,185	5,978
Nantucket,	105	15,973	152	182,966	1,742
Norfolk,	2,331	135,112¼	58	10,746,735	4,610
Plymouth,	3,587	200,193	56	9,257,524	2,581
Suffolk,	369	8,203½	22	10,891,373	29,516
Worcester,	8,979	734,987¼	82	33,636,905	3,746

Included among the farms of the State are the market-gardens, the total acreage of which is 3,989 ; total value, $1,147-200 ; average value per acre, $288—the latter rising as high as $1,101 in the county of Suffolk. Of the whole number of farms in the State, only 1,054 are carried on by parties who hire, while 43,495 are carried on by the owners. On the 44,549 farms of Massachusetts there are 43,620 dwelling-houses and 46,848 barns. The whole number of farms is 1,549 less than in 1865, when it was 47,014. This is accounted for by aggregation and the growth of cities encroaching upon the suburbs.

The land of the farms for 1865 and 1875 is divided into four classes, as follows :—

	1865. Acres.	**1875.** Acres.
Land under crops,	881,402	912,521
Unimproved land	1,052,374¾	1,469,988⅛
Unimprovable land,	282,359	89,457¼
Woodland,	1,019,343⅝	930,402½
Total,	3,235,479⅜	3,402,368⅞

Hence it will be seen that the proportion of improved and cultivated land has considerably increased during the last ten years.

The aggregate value of farms, with all their appliances, is found to be as follows :—

Land,	$116,629,849 00
Buildings,	66,033,291 00
Fruit trees and vines,	4,674,188 00
Domestic animals,	17,316,381 00
Agricultural implements,	5,321,168 00
Total for 1875,	$209,974,877 00
Total for 1865,	176,579,965 00
Increase in ten years,	$33,394,912 00

By a reference to the tables of domestic animals, it will be seen that the horses on farms number 53,218, the whole number in the State being 129,969. The number of cows on farms, including heifers, 154,091; of milch cows, 126,034. Whole number of cows in the State, including those not on farms, 148,395. A large proportion of the fruit trees of the State are to be found in small gardens and orchards not connected with farms, and hence are not included in these return.

The total number of persons employed on farms is 35,488; this number includes only those who have been paid wages for their labor. The entire number engaged in agriculture is 70,945; but this includes proprietors or owners of farms as well as the farm hands. Deducting the former from the latter, we have 35,457 to represent the number of proprietors. In 1865 the total number engaged in agriculture was 68,538.

The total wages paid for farm labor during the last census year was $5,600,919. The wages for previous years have not been reported, and no average can be given, owing to the desultory nature of the employment.

An examination of the table which gives the domestic and agricultural products by name, with the towns where they were produced and also a table of comparison showing the quantity, value, average value and acreage (when applicable) of the chief products of the State for the years 1845, 1855, 1865 and 1875, making due allowance for fluctuations in the currency, shows the changes in crops, in value, in acreage, in average yield per acre, and the increase or decrease in the leading crops. The result is gratifying in many respects, for while it is seen that there is a loss in the great staple products of barley, corn, oats, potatoes and wheat, there is for each of these crops an increased yield per acre; the lighter crops, beans, beets, carrots, cranberries, onions and turnips, show large increase generally, not only in amount raised, but in yield per acre; the hay crop has increased in quantity and in average yield per acre. The butter product, 8,000,000 pounds, does not vary much in quantity from that of 1845 and 1855; but it is more than double that of 1865, and has also more than doubled in price and aggregate value during the last thirty years, the latter amounting to $2,747,878 in 1875. The total product of cheese for 1875 was 3,067,017 pounds, valued at $405,293. This item of cheese includes only that made on farms, but to make a fair comparison of our products at the present time with any former period, the very considerable amount now manufactured in cheese factories ought to be added.

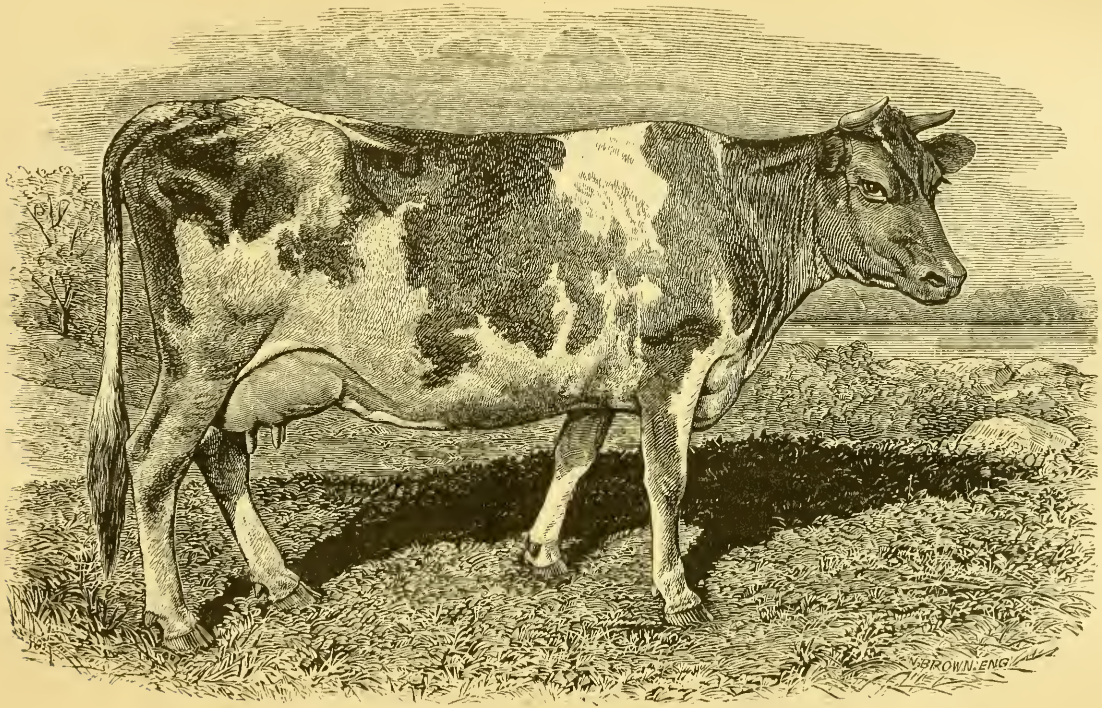
There is another consideration which should be kept in mind, and which does not come strictly within the range of the census returns, and that is the greatly increased intrinsic value of our stock, arising from the general progress of improvement and more skilful breeding. Our dairy stock, especially, has undergone a very marked change in the last twenty years. In 1855, for example, the number of pure-bred cows in the State was comparatively small. The number of pure Jerseys could scarcely have exceeded a hundred, all told, whereas now there are single herds that number as many, and there are few sections of the State where they are not common. The dairy stock has a far higher standard of quality, and money value, though this quality does not, of course, appear in the returns. In a vast number of cases the mere number is all that is thought necessary to give, and the increased money value does not clearly appear. In the eyes of an assessor or a census taker, apparently, a cow is a cow, whether she is worth $20 or $200, and yet every farmer knows that one cow may differ very much from another cow in intrinsic and money value. In other words, quality, or purity of blood, now has a great money value, vastly greater than it had twenty years ago, and this is not, in the nature of things, accurately represented in any census, as it is commonly taken.

There are many other directions in which great improvements have been made, which add greatly, not only to the comforts of modern life, but to the ease and efficiency of work on the farm, and which are not fully recognized in any census, such as the improved machinery by which economy of labor is secured, saving the wear and tear of human muscle and, at the same time, accomplishing greater results; improvements which have a money value far higher than that expressed in the mere value of the machines or implements themselves, as they appear in the enumeration.

There is another respect in which vast improvements have been made, but of which we find no evidence in the census. The resort to manufactured and commercial fertilizers for the supply of plant-food is not only of modern date, but it may be said to have assumed its present important aspect wholly within the last ten years. Previous to the enactment of what is commonly called the fertilizer law, the farmer had no protection against fraud. There was no well-recognized standard to which commercial products of this character were required to conform. Failure after failure, due sometimes to the dishonesty of manufacturers or dealers, and to adulterations which there were no adequate means to detect, sometimes to improper modes of application and treatment, had led to a universal distrust and want of confidence in the value of such fertilizers, and their use was, in consequence, very limited. The law now gives a reasonable degree of protection to every farmer who buys with ordinary care, and the standard of quality is not only far higher but the means for ascertaining this quality very much more within the farmer's reach. This will be seen, on a moment's consideration, to be a most important step in the way of progress. When the production of farm crops was dependent chiefly on the manurial supplies of the farm alone, there was a limit beyond which no farmer could go in the profitable production of human food. A perfected system of artificial supply of plant-food, such as we have reason to anticipate in the not distant future, will vastly increase the possibilities of production, and place the practical pursuit of farming on a level with any other branch of applied chemistry. Then capital will find not only a safe, but a desirable and profitable investment in farm operations, and thus aid in developing the productive capacities of the Commonwealth.

CHARLES L. FLINT,
Secretary of the State Board of Agriculture.

BOSTON, January, 1877.



Jersey Cow "JERSEY BELLE," owned by CHARLES O. ELLMS, Esq., of Scituate.
See Preface to Part Second.

APPENDIX.

REPORTS OF DELEGATES

APPOINTED TO VISIT THE

AGRICULTURAL EXHIBITIONS.

ESSEX.

It was my good fortune to be assigned as delegate to the Essex County Society, which held its annual fair in Danvers, September 26 and 27, 1876.

This Society has several characteristics that distinguish it from others in the Commonwealth. It is one of the oldest, having celebrated its fifty-sixth anniversary the past year. It has no abiding city or permanent locality for its exhibitions; but having remained in one part of the county for a year or more, it then folds its tents and moves to pastures new, where it may scatter its benefactions over some other section of its domain.

The expediency of this course may be questioned in some of its relations. But while many of the agricultural societies are largely in debt,—having all their funds, and more, locked up in expensive grounds and buildings, from whence little benefit is derived, save in their use at the annual fair,—the Essex has its money invested where it will do the most good in annual interest, and where it is available for use whenever needed.

Its income from that source in 1875 was $1,969.68, or nearly one-half of the amount received by all the other societies, the same year, as income from their property, if we except the Massachusetts, which holds no exhibition.

Another peculiarity worthy of note, is the fact that no premium has ever been paid by the Society for speed in horses.

While it is claimed by many that no agricultural society can long be successful and draw the people, without the excitement of the sports of the turf, the Essex, for more than half a century, has disbursed large sums in premiums,—has drawn crowds of people to its annual fairs (it was estimated that 10,000 witnessed its last exhibition),—has a fund of over $25,000, and it stands to-day second to few, if any, in the Commonwealth in what constitutes a model agricultural society.

The show of animals was somewhat smaller than usual, but the quality was creditable.

The ploughing-match was spirited, being participated in by 23 teams, and viewed by a large crowd of interested witnesses.

The exhibition of fruits, flowers, and fancy-work, in the hall of the Peabody Institute, was exceptionally fine and attractive.

As we glanced over the beautiful hall and its contents,—the tables loaded with tempting fruits, the walls adorned with varied colored fabrics of utility and beauty,—the handiwork of the fair daughters of Essex County,—all being embellished with a profusion of flowers and rare plants, skilfully arranged,—the display produced a scene pleasant to view, and profitable to contemplate.

The portrait of one of the founders of the Society, that adorned the walls, seemed to look with complacency on the results which he initiated.

The vegetable department was full, and of first quality. And it was claimed that, although some were of mammoth size, there was not a "dead beat" in the collection.

The annual address was made by C. M. Tracy, Esq., of Lynn, on the relation of agriculture to the best and highest civilization. The close attention of the intelligent audience was a true test of its interesting character and excellence.

Last, but not least, was the public dinner of the Society, which was ample in quantity and excellent in quality, as evinced by the alacrity with which some 500 persons partook of the repast. Of the intellectual dessert that followed, it is sufficient to say that His Excellency Governor Rice, Geo. B. Loring, Charles P. Thompson, Allen W. Dodge, and others, furnished each a choice offering for the occasion; at the close of which your delegate left, well pleased with what he had witnessed, and thankful for kind attentions and courtesies received.

GEO. M. BAKER.

MIDDLESEX.

The Middlesex Society held its fair on the 28th and 29th of September. I had the honor to attend it as a delegate, and take pleasure in bearing witness to its excellence, in most respects. The delightful weather made every one inclined to enjoy and look favorably upon all things, so that, I fear, were there anything to which your delegate should object, he would have been blind to it on that exquisite day.

My long drive to Concord, across the valley of the Charles, and over the historic ground near Concord, put me in a most favorable mood for viewing the various pleasing features of the exhibition.

Mr. Moore kindly received and showed me over the grounds. The herds and swine, of various breeds, filled the sheds. Horses for agricultural purposes were not, as I regret to say is usually the case at our agricultural fairs, to be seen.

The tables in the hall were covered with a magnificent display of vegetables, fruits, and flowers, with some samples of butter, also of good quality. This part of the exhibition was worthy of all praise, and I passed a most delightful hour in examining it. Seldom have I seen a more varied and beautiful array of the treasures of autumn.

The show of poultry in the basement was small, but good.

The tables in the upper hall were well filled, and the crowd of happy faces around the board was the pleasantest sight of all. After the cloth was removed, the Rev. Dr. Hosmer of Newton entertained the people with an extempore discourse, which was as genial as the expression of his pleasant face.

And then came the great and exciting feature of the day,—*the horse-trot*,—which, to my mind, is wholly foreign to the spirit and intention of the founders of these societies, and to the grant made by the Commonwealth for their encouragement. The assurance that no portion of the bounty of the State goes to the support of these poor shows, is certainly some consolation to the mind of the conscientious delegate from this Board. If the trotting were confined to horses exhibited by the members of the Society, it would afford a plausible excuse for the entertainment; but the lot of poor hacks which generally are dragged from their hiding-places to travel over the country, and, by previous agreement between their owners, divide the small purses among them, are but a sorry sight to him who wishes the agricultural societies to assume their true place, as institutions elevating the taste and educating, and not simply amusing, the people.

It was a pleasing contrast to be called from the race-course by Mr. Moore, and, in company with Mr. Hovey, to be driven through the shady streets of Concord, by the old battle-ground, out to his delightful farm, and shown those gardens, green-houses, and meadows where he grows his fine vegetables, flowers, and fruits, and to enjoy the intelligent discourse of these gentlemen on their various modes of cultivation and propagation.

The Middlesex Society is in excellent condition, and well deserves the bounty of the State.

LEVERETT SALTONSTALL.

MIDDLESEX NORTH.

The exhibition of this Society took place on the 26th and 27th of September, 1876. The weather was anything but pleasant,—rain and mud, and mud and rain. People cannot feel good under such circumstances. Still, they brought together quite a respectable show, and every department was more than middling. There were many fine specimens of dairy stock, and a fair show of working and fat cattle.

The show of vegetables, fruits, and flowers was excellent, and a large collection of wild flowers attracted much attention, and they were worthy of a higher premium than they received.

The show of poultry was fine, and the minor departments were respectable.

The horse was the principal attraction on the outside, and occupied the spare time of the Society. The attendance was in sympathy with the weather.

After dinner, speaking from the judges' stand.

The Society deserved a better success. The officers have my sympathy and my gratitude for their attentions to your delegate.

ELIPHALET STONE.

MIDDLESEX SOUTH.

The twenty-third annual cattle-show of the Middlesex South Agricultural Society was held at Framingham, September 19 and 20, and the undersigned was designated to represent the "State Board," in place of the delegate regularly assigned, who was unable to attend.

The display of stock was very fine. Sturtevant Brothers of South Framingham entered a herd of 20 Ayrshires. The "Happy Family" of Jerseys, exhibited by Mr. S. F. Twichell, consisting of mother, three daughters, three grand-daughters, and son, was an interesting feature. The Jersey stock exhibited by Mr. E. F. Bowditch of Framingham was very creditable. Mr. W. P. Perkins of Wayland entered a Guernsey bull and five heifers. Several Natives were exhibited by Mr. John Johnson, and there were other noticeable entries, consisting of Dutch and Holstein stock, fat cattle, working-oxen, etc.

Of horses, there were single roadsters, matched carriage-horses, family horses, breeding mares with foal, colts, and farm-horses.

The swine exhibit, though not extensive, was very good, Mr. W. G. Lewis of Lawn Farm, Framingham, showing 20 specimens of the Eden's breed, among which was a boar, imported in 1874, the first one of the breed. There were other creditable exhibits by Messrs. L. and G. W. Chadwick, E. F. Bowditch, J. W. Walkup, P. McMahan, Charles Cutting, and E. R. Warren.

There was a fine display of fowls, Mr. A. F. Stevens of Natick showing 12 pairs of Bantams (Bristol game), which were beauties. Messrs. J. E. Fisk, H. B. May, D. E. Wheeler, and M. L. Brown of Natick, and G. H. Woods of Wellesley, and others, exhibited a variety of poultry. Mr. Ramsdell of Natick contributed 35 pairs of Carrier Pigeons, which attracted universal attention.

There were 110 entries of fruit, 62 of seed grain, and 37 of vegetables.

Among the other articles on exhibition may be mentioned a good display of flowers, a splendid collection of stuffed birds, etc., exhibited by Mr. J. W. Giles of Marlborough, a fine-art department, consisting of 23 entries, comprising crayon, water-colors, hair-work, penmanship, etc., a tempting display of honey, jelly, and preserves, a department of fancy-work, worthy of careful study; and last, but not least, a centennial antiquarian department, containing a valuable, interesting, and extensive collection of relics. Your representative was obliged to confine his visit to a few hours upon the second day, and was therefore unable to witness the several trials of speed between the horses entered.

His Excellency the Governor, accompanied by several members of his staff, arrived at noon, and was escorted to the hall, where an excellent dinner was served. After dinner an address was delivered by His Excellency, which was followed by an original poem and several short speeches, interspersed with music by the Framingham brass band. The day was rainy, and the attendance not large, in consequence; separate from this fact, the exhibition should be chronicled as a success, and your delegate is under obligations to the President, Mr. Johnson, and others, for courtesies extended during his brief stay.

HENRY B. PEIRCE.

WORCESTER.

The fifty-eighth annual fair and exhibition of the Worcester Agricultural Society was held on Thursday and Friday, September 21 and 22, on the Society's grounds.

The weather was damp and chilly at the opening on the first day of the fair, but there was a good attendance of those who were interested in the fine display in the hall, of fruits, flowers, vegetables, and the mechanic arts.

The show on the ground was excellent. At the head of the list of neat-stock ranged the famous Swiss herd of 24 in number, entered by G. D. Aldrich of Auburn. They were a fine-looking breed, but did not comprise half the herd now owned by Messrs. Aldrich and David G. Hall of Providence, R. I., and kept on the farm of Mr. Aldrich. This herd of European cattle was originally imported from Switzerland by Mr. H. M. Clark of Belmont. We learn from a statement by the proprietors, that every animal has fourteen distinct marks, found by experienced breeders in all thoroughbred animals, showing the milk and butter qualities and the purity of the race. The bulls and heifers, when two years old, weigh from 1,000 to 1,400 pounds each ; cows, from 1,500 to 1,600 pounds per cow ; and matured bulls, from 2,000 to 2,700 pounds. They are said to be thrifty, hardy, and mature early. A record of the product of milk shows 196 quarts from one, "Geneva," in seven successive days, and 175 quarts from "Christina" in the same time. It took from seven to eight quarts of milk, on an average, to one pound of butter.

The next in order was a fine show of Shorthorns, by Wm. S. Slater of Webster. Some of them were imported, and were very large, well-formed stock. One bull weighed 2,700 pounds. J. S. Ellsworth exhibited a herd of 13 of this breed, and several Shorthorn grades. Darling Brothers of Auburn also had several head of this class.

The Ayrshire exhibition consisted of 27 head, by Messrs. B. F. & H. A. Harrington. The cows were fine-looking. There was a thoroughbred bull, "Duncan," in this collection. Chamberlain had nine cows of this class. Harvey Dodge of Sutton had an excellent herd of Devons on exhibition. The herd of Jerseys, by O. B. Hadwen of Worcester, merit more than a passing notice. There were 18 head, the progeny of one cow. They were strongly marked with shade, form, and other remarkable points which characterize this excellent breed, and were very creditable to the skill and genius of thorough-breeding. William T. Merrifield of Worcester and Wm. P. Knight of Grafton had fine shows of Jerseys, of beautiful shades.

There was a native herd, by Elbridge Hewitt, who had a fine-looking bull. The above classes of entries comprised about 200 head.

The show of oxen was very good. The exercises of the class of trained steers were exceedingly interesting and attractive, illustrating the wonderful power of kindly influences in the treatment of domestic animals, to inspire them with love and confidence. The nobleness of man seems to humanize the animals under his care.

The display of sheep was very limited in numbers, but of good blood, being Southdown and Cotswold grades. The swine were Suffolk, Chester, and Sheffield breeds. The exhibition of sheep and swine at our county fairs is diminishing in interest and numbers annually,—probably the results of the fact, that they can be raised with more profit in other States than ours, and imported by us.

There were 53 entries of poultry and pet stock. Among the poultry there were a number of excellent imported breeds, showing an increasing interest in this, as well as in other counties in the State, in the improvement of this class, to render it more interesting and profitable.

The show in the hall was very good, considering the exhibition in a similar department which was held at the Horticultural Hall during fair-days, and tended somewhat to divert the interest and attraction.

The exhibition of fruits, flowers, butter, cheese, bread, fancy articles, and vegetables compared favorably with former years.

The exercises of the day opened with a ploughing-match. The work was well done by the teams, and trials of working-oxen and steers were perfectly satisfactory. At noon we were regaled with a sumptuous dinner in the upper hall. Several hundred were present on the occasion. The President, Charles B. Pratt, Esq., presided. After dinner, an hour was pleasantly passed with an intellectual feast, from addresses on the topics of agriculture and social culture, by several attractive speakers. Then followed the concomitant exercise in the bill of fare at our county cattle-shows,—"the horse-trot." If not possessing the instructive features of others, it has the merit of rare attractiveness, and an absorbing interest unequalled by any, or all other departments, of the exhibition.

Thus passed the afternoon of the first day. Friday, the second day of the fair, was ushered in by a bright sun and serene sky. "Old Probability" marked down a delightful "Indian Summer" day in the calendar. The exercises of the day began with the exhibition of brood mares and colts, after which the family-horses were driven around the track, showing excellent action and style. There were some noble stallions of Hambletonian, Messenger, and Morgan stock shown, which were very creditable to their breeders.

At noon His Excellency Alexander H. Rice and staff arrived at the grounds, and were guests, with other distinguished personages, including the Secretary of State, Henry B. Peirce, Esq., and Hon. Ginery Twichell of Brookline. They repaired to the upper hall and partook of a generous dinner, in company with several hundred members of the Society and their guests. After which His Excellency Governor Rice was loudly called to the front, and was introduced to the audience by President Pratt.

He responded with an excellent characteristic address, on the thrift and prosperity of Worcester County, and on the benefits of small farms; that Massachusetts had a national reputation from her farming industry, on account of her agricultural products; an enlightened policy in farming and social culture tends to the enlightenment of the nation, to advancement in arts, and sciences, and civilization, and the nation which excels in these respects will be foremost; he saw no reason why the United States should not be in this desirable position. Others followed with fine addresses.

The remainder of the day was devoted to the exercises of the track. The time made was deemed excellent by the judges; as was expected, a large and enthusiastic gathering was on the ground to witness the speed of the horses. The Worcester brass band was in attendance during the fair, and enlivened the scene by their fine music.

Your delegate is greatly indebted to Messrs. Charles B. Pratt, the President, G. H. Estabrook, the Secretary, O. B. Hadwen, and others of the committee of arrangements, for information given him, and courtesies extended during his visit to the fair, and is well satisfied to recommend the Worcester Agricultural Society to the favorable notice of the State Board of Agriculture, as entitled to credit for their untiring interest in the prosperity of the Society, and their ardent desire to perpetuate the benefits which they have enjoyed during the past half-century to their successors to the future centennial.

Alexander Macy, Jr.

WORCESTER WEST.

Having been appointed by the State Board to attend as a delegate the Worcester West Society at Barre, September 28 and 29, and knowing that there was a railroad called the Boston, Barre and Gardner Railroad, I supposed, of course, I could reach Barre some time in the early part of the forenoon, so I managed to get the first train, and was left at the Hubbardston station, eight miles from Barre, where, by chartering three different carriages, I arrived at the cattle-show grounds at 12.15 P. M., deposited a 25 cent scrip, and passed into the gate, and made my way directly to the exhibition-hall, where, as I had anticipated, I found a very fine show of articles, such as are usually exhibited in such shows ; in particular, the butter and cheese was very fine.

After leaving the hall, I started to take a look at the cattle ; met the President of the Society, passed the time of day with him, and passed on alone. The dairy stock was good, yet the majority was rather thin of flesh, owing to the extreme dry weather, which had shortened the pastures.

The working-oxen and steers made a fine show. The four teams of five pairs of oxen and steers each made a very fine appearance, and were creditable to the owners. The trained steers from Charlton, Sutton, and Southbridge made a fine appearance, and were worthy of special mention. The time allowed me for looking over the stock department was so short, that I cannot specify as I would be glad to.

My friend, A. H. Holland, of this Board, escorted me to the dinner-table, where was provided an excellent and bountiful dinner, which was enjoyed by some four hundred ladies and gentlemen, who seemed to enjoy the dinner and the after-dinner speeches. President Ginery Twichell presided, and introduced the speakers very pleasantly.

As I was obliged to leave at noon, the second day, I cannot say so much about the horse-show as I would like to, but it seemed to me, as a whole, that the Society sustained its former good reputation.

I shall ever feel grateful to friend Holland and his family, for the kindly treatment I received at their hands while with them.

ELIJAH PERRY.

WORCESTER NORTH.

In obedience to the wishes of this Board, I attended the twenty-fourth annual exhibition of the Worcester North Agricultural Society, held on the Society's grounds, at Fitchburg, September 26.

The day was quite unfavorable. The signs of the early morning indicated rain, which did not, however, put in an appearance to any extent until late in the afternoon.

The attendance was quite good, notwithstanding the threatening attitude of the weather ; but this might have been partially attributable to the presence of the Chief Executive of the State and other public men.

A person passing through this region and seeing the hillsides dotted with farm buildings, stretching their rich pasture and meadow lands out before him, and finding upon some of them such herds of blooded stock as those of Miles and Whitman's, naturally expects that an exhibition of stock here would be one of great merit, but on this occasion he would have been disappointed.

The show in the department of neat-stock was quite inferior to what it should have been, even for a rainy day.

I saw a few good cattle from the estate of E. T. Miles; also two or three herds of very good Jerseys, and a very good pair of cattle from Daniel North of Leominster. The town of Leominster exhibited the only town team, consisting of 19 yokes, which to us seemed a rather slim affair. We saw no sheep. There were a few swine, among which we noticed some very fine specimens of the Berkshire breed, exhibited by Stephen Shepley of Fitchburg.

The poultry department was well filled, and, all things considered, equalled our expectation. At the "ploughing-match," we saw no ploughing, and afterwards heard it announced as a failure. We saw some very good horses; but this department, like that of neat-cattle, was not what one would expect from Fitchburg and its surroundings.

The agricultural department of the hall likewise showed the damaging effect of drought, lowery weather, or, possibly, what is worse, a lack of interest.

The officers showed commendable zeal, and nothing seemed to be left undone by them. The trouble, evidently, was a lack of coöperation on the part of the members of the Society. We learned that some of the towns within the bounds of the Society held exhibitions of their own, which might have lessened their interest in the parent society. My impression, however, is, that such shows should produce an opposite result.

We thought we discovered a desire on the part of some to make the occasion one for political demonstration, and, viewed from that stand-point, it was, perhaps, quite as successful as an agricultural show.

The encouragement given by the presence of Governor Rice, his manifest interest in agriculture, and words of cheer for farmers, was worthy of commendation, and gave an impulse in the right direction.

Perhaps the almost unparalleled drought of the past season, and the all-absorbing political excitement of this centennial year, in addition to the unfavorable state of the weather, might furnish a sufficient excuse for any shortcoming on the part of the members of the Society.

The thanks of your delegate are due to the officers of this Society, and others, who kindly afforded him every facility for obtaining information, and provided abundantly for his personal comfort.

E. C. Hawks.

WORCESTER NORTH-WEST.

We arrived on the grounds of this young and vigorous Society, at Athol, on the morning of Tuesday, the 3d of October, the first day of the fair. The land occupied by the Society, comprising twenty-eight acres, lies something over a mile from the railway station, and is quite elevated, giving an extended view of the surrounding country. It was bought and fenced six years ago, when suitable buildings were erected for the use of the Society, and a convenient track laid out and graded for the display of horses.

The Society appears to have the elements essential to prosperity,—a good location, active and intelligent officers, and all the appliances for conducting a successful show. This exhibition was the tenth since the Act of incorporation was granted in 1866, but several exhibitions had been held previously by a voluntary organization of a few citizens of Athol and vicinity, beginning as early as 1856. In 1858 a permanent organization was formed, and eighty-one life-members were obtained, each paying one dollar, and from that date fairs were held annually, till the Society sought and procured its charter of the Legislature, with the designation of the Worcester North-West Agricultural and Mechanical Society. A committee was at once appointed to examine different locations, with a view to purchasing and laying out grounds, and these were occupied for the first time in 1869. Since then the Society has been constantly making additions and improvements, and steadily increasing in numbers. It has, at the present time, about eight hundred life-members, and has grown from a little town-show to an exhibition that is patronized by a large circle of towns in its vicinity. It distributed in 1876 over $1,300 in premiums, among more than two hundred contributors.

So far as we could learn, from conversation with intelligent persons familiar with the past history of the Society, it has exerted a very marked influence upon the agriculture of Athol and the surrounding towns. Very little, if any, pure-bred stock was owned or raised in the vicinity at the time of the first exhibition, twenty years ago. At the exhibitions now, a very large number of excellent pure-bred animals, of several of the prominent breeds, appear every year, and the farmers of the neighboring towns now take more interest, and give more attention, to breeding choice stock, than they ever did before. The grade and common stock which we saw on exhibition plainly show this. The quality of many of the dairy-cows and working-oxen was such as to have done credit to any exhibition of the kind in the country. The amount offered for live-stock, on this tenth anniversary, was $663, and of this sum, $499 was actually awarded.

The attendance on both days of the exhibition was very large and satisfactory, and the people all appeared to enter heartily into the spirit of the occasion, and not only to enjoy the sights, but to study and profit by a careful examination of all parts of the show.

The display in the hall was very extensive and fine, especially in the department of fruits, the dairy, and domestic manufactures.

On the second day, the exhibition was honored by the attendance of His Excellency Governor Rice and staff, and many other distinguished guests. Though I saw some things to criticise in the management of the exhibition, my visit was, on the whole, highly satisfactory.

William Knowlton.

WORCESTER SOUTH.

The twenty-second annual exhibition of the Worcester South Agricultural Society was holden at Sturbridge, September 14 and 15. The days were fine, yet crisp, while a small shower in the night of the 14th served to lay the dust on the track and grounds, which were then suffering, like the country surrounding, from a long and excessive drought. An early start from home, and a ride of fifteen miles over hill and through valley, past the ripening corn and the orchards, which were bending under their enormous fruitage, by the forests and hillsides, which were just beginning to put on all their varied hues, brought me to the grounds in time to take a cursory survey of the premises and surroundings before the exercises of the day commenced.

Nathaniel Upham, Esq., the President of the Society, and a member of this Board, was at his post, and afforded your delegate every facility to obtain all information, and a view of every feature of the show.

The ploughing-match opened the exercises of the day. The most objectionable feature was the dryness of the ground,—the sward would break; still, the work was well done, and the match was sharply contested. Six premiums were awarded to the veterans in this art, and three to the boys. If more farmers would thus encourage their sons, there would be less occasion for complaining that the boys rush to the cities, leaving the old homesteads deserted when the present generation passes off the stage, or to return to the primeval forest.

The working-cattle were shown in three classes,—working-oxen, working-oxen four years old, and working-steers. These several classes did themselves, their owners, and their drivers credit.

The exhibition of stock, trained for the yoke, was of a high order, and seldom excelled in any part of the State.

The milking-stock consisted of Ayrshire, Durham, Jersey, Devon, and their grades. Some of these were good dairy-cows, a few deep milkers; but, as a whole, the cows were inferior to the oxen.

Seven pairs of steers and calves contested for the premiums offered for those best trained. Why this class should be styled "fancy trained," I am at a loss to conjecture. The propriety thereof I question. It is a class of cattle that always attracts attention and excites interest. While such training of the calf and steer, by the word and motion of the boy, tends to benefit and perfect both trainer and trained, to amuse and entertain the beholder, the great, paramount good arising therefrom comes from the fact, that, a more docile, confiding, and obedient team is provided for the tillers of the soil, and carries proof positive to the keepers of all kinds of stock, that gentleness with decision, and docility with firmness, are traits necessary for the best control of our domestic animals. If every dairy-cow were thus trained, cared for, and caressed, the tendency of her udder would be more toward butter globules and less toward garget.

The Society has a large and commodious hall, and it was well filled with the fruits of the orchards and gardens, the vegetables of the fields, the handiwork of matrons, and the needle-work of the maiden.

The show of swine proved that this class is appreciated in this region.

In the class of sheep, the cossets, bucks, and ewes carried off six prizes, and were respectable specimens of their kind.

In poultry, the specimens were not numerous, although there were good birds on exhibition.

The bread, butter and cheese were good and attractive.

The flowers in the hall, artificial and cut,—those naturally grown and those in pots,—made an attractive show; while the productions of the nimble-fingered lassies, in the shape of tidies, mats, pillows, etc., absorbed the attention of all.

The music was furnished by the Southbridge Mechanics' Band, and the dinner was served in the lower hall, where were gathered the farmers and their wives, who seemed to enjoy the good things provided by Caterer Oakes. After the appetite was appeased, all gathered in the upper hall, where no formal address was delivered, but the audience listened to a free and easy talk from the delegate of the Board, N. S. Hubbard of Brimfield, an ex-delegate and member of this Board, and others, who discussed grasses, milch cows, and feeding the same, root crops, fertilizers, and kindred subjects, in which farmers have a common interest. Some specimens of by-gone days, in the hall, reminded the antiquary that this was the centennial year, and manifested that the good old times of our ancestors were remembered, and their relics sacredly cherished.

The second day of the fair was the horse-day, and a grand cavalcade ushered in the exercises of the morning. Interest was manifested in the colts, turn-outs, family-horses, and trotters, and yet it did not seem to eclipse that of the previous day. The races showed some light-footed, fine-stepping, square-trotting animals, and the prizes were won by "John Henry," "Fearless," and "Emperor."

The assets of the Society are $13,900, the liabilities $4,243.50, and the relative standing is about $400 better than last year.

This fair seemed to be the farmers' holiday. The mechanic, the merchant, the operative, all joined in the festival. Considering the show in all its departments, we came to the conclusion that the Society is doing a good work for the farmers, and the tendency of the fair is to foster agriculture, the object for which this Society was incorporated.

HORACE P. WAKEFIELD.

WORCESTER SOUTH-EAST.

The seventeenth annual fair of the Worcester South-East Agricultural Society was held at Milford, September 26, 27 and 28.

How a fireman's muster can be run in connection with an Agricultural Society was shown most successfully on the first day. Six hundred dollars were awarded in premiums. This left to the Society, net, the sum of $1,000. Financially, this was a good beginning.

During the night previous to the second day, a heavy rain-storm prevailed. But the morning ushered in a bright and cool autumn day. My attendance was only on this day. This day's exhibition commenced with the ploughing-match, a mile from the fair-grounds. It was contested with skill and spirit by the ploughmen, and was witnessed by a large number of spectators, with apparently much interest. Twenty-four teams in all were entered. Six of these were spans of horses. Of oxen, seven were double, and eleven were single yokes.

The grand line of march leading through Main Street, was then taken up, with marshals and music. Arriving at the fair-grounds, the trials with working-oxen and steers commenced, and occupied a large part of the day. There were over thirty, in five classes. A number of ox-wagons appeared, loaded with stairs, wheels, stools, hoops, etc., with which to exhibit trained steers. This novel exhibition was quite successful; many of the feats were as remarkable as those of trained circus-horses. I saw much in this to admire, and nothing to censure. Persevering firmness and kindness were the means used. I think the large and admiring crowd of spectators must have had a better appreciation of the brute animals than before. Good working-oxen and trained steers seem to be a specialty in some towns in this vicinity. What was offered in premiums for oxen and trained steers, in their several classes, indicates more interest taken by the farmers in these than in other classes of stock. There were, however, about 50 head of cows and heifers, of fair quality, but not quite up to what should be the standard in this part of Worcester County. A few sheep and swine were present in their various classes. A due amount of interest in the poultry department was manifest by the number and quality shown. The horses and colts were mostly reserved for the third day. I did not witness this day's proceedings, and cannot report.

The hall was well filled with a good display of apples, pears, grapes, vegetables, and other farm products, witnessing to the full and ample fruitfulness of the year, and the industry and interest of the farmers therein. The hall was not wanting in the miscellaneous articles which usually make up this part of the fair, and was a scene of much interest.

The dinner in the upper hall of the Society's building was well appointed and served. Hon. William Knowlton, President of the Society, presided, with appropriate ceremonies. The music was of high order, by the Milford band. Here followed a good farmers' talk. Addresses were made by Rev. George S. Ball of Upton, Hon. Valorous Taft, also of Upton, Dr. Pratt of Hopkinton, B. D. Godfrey of Milford. Chaplain Ball's address was well calculated to move the farmers to a better appreciation of their privileges and duties. Mr. Taft, and others, referred to the marked success which was attending the use of Professor Stockbridge's mineral fertilizers in raising corn. Mr. Taft thought money was easier made in raising corn in Worcester County than in Illinois.

It is much to be regretted that an intellectual entertainment like this draws the attention of so few of the farmers and others. There were many vacant seats at the table. This should have been the great attraction of the day. Men are awaking to a better system of husbandry. I ask the farmers and others to see well to it that an intellectual banquet of high order is always provided for their annual festival, and then grace it with their presence and hearty sympathy.

I wish here to record my grateful remembrance of the hospitality and kindness extended to me by the President and his family, at their pleasant home.

C. SANDERSON.

HAMPSHIRE, FRANKLIN, AND HAMPDEN.

The fifty-eighth annual exhibition of the Hampshire, Franklin, and Hampden Agricultural Society was held on Wednesday, Thursday and Friday, October 4, 5 and 6. The weather on the first day was very favorable, but the second and third were very rainy, the attendance was very small, and, finally, the Society was obliged to adjourn all proceedings until fair weather. The receipts at the gate were, in consequence, very small.

On my arrival on the ground, I was introduced to the President, Secretary, and a number of other gentlemen, who escorted me around the grounds with much attention.

My first object was to examine the stock. First, my attention was directed to the herd of Milo J. Smith & Son, consisting of one bull, the "Baronet," six years old, weight, 1,800 pounds, sired by the 14th Duke of Thorndale; also, eleven cows, nine heifers,—all thoroughbred Shorthorns, and animals of great merit.

A. T. Judd of South Hadley showed a herd of fifteen Shorthorns: one bull, "Oxford Chief," three years old, weight, 1,900 pounds; a bull-calf, eleven months old, weight, 850 pounds; twelve cows and heifers,—all fine animals.

S. A. Bates of South Hadley exhibited a herd of fifteen head of thoroughbred Shorthorns,—and a fine lot, too. The herds of Mr. Smith, Mr. Judd and Mr. Bates would be a credit to any state show.

There was only one herd of Ayrshires, and that was exhibited by John P. Thorp. Mr. Thorp's object is to furnish milk for the market, and his herd is well adapted for the purpose.

H. C. Haskell of Deerfield exhibited a herd of eleven thoroughbred Jerseys. Mr. Haskell's herd was a cattle-show of itself. Quite a good number of grades of the different breeds were on exhibition,—very creditable animals.

The State Lunatic Hospital sent down four yoke of oxen, fat, sleek, and well fed. Their weight was, respectively, 4,010, 3,860, 3,790, 3,730.

The number of entries of stock is as follows: working-oxen, 14 pairs; steers, 2 pairs.

Miscellaneous stock, 26 entries. Seven herds, consisting of 97 head; 35 thoroughbred milch cows; 8 grade cows; 4 grade heifers; 17 thorougbred heifers; fat cattle, 3 entries. Bulls, 12 entries. Swine, 16 entries. Sheep, 20 entries, including bucks and lambs. Town team, one entry.

The show of horses was very much dampened by the rain. Nevertheless, there were stallions, pairs of gentlemen's driving-horses, family-horses, breeding-mares, draught-horses, and colts of different ages. Some trotting was anticipated, but the track was so wet it was postponed until a future day.

I am sorry to say that there was no provision made for ploughing. This I consider an important part of an agricultural exhibition, and the foundation of all true culture.

Of swine, Poland, China, and Chester Whites were the most numerous, and were very fine specimens.

Of sheep, a fair lot were on exhibition, some Southdowns and other mixed breeds of the Leicester. Whole number of sheep on exhibition about 150.

Poultry: In this class there were 56 entries. Among the varieties were found Light Brahmas, Buff Cochins, Pat. Cochins, American Dominiques, White Dorkings, Black Spanish, Golden-Spangled Hamburgs, Games, Bantams, Plymouth Rocks, Brown Leghorns, White Leghorns, Dominique Leghorns, Houdans, Silver-Spangled Hamburgs.

Among the miscellaneous entries were found pigeons, geese, ducks, rabbits, squirrels, etc.

The hall was located near the entrance of the park. Its dimensions are 110 feet long, 45 feet wide, two stories high. It was very tastefully trimmed with evergreens by Mrs. Stebbins, wife of the President of the Society, and Edward B. Strong, the general superintendent of affairs inside.

The principal feature was the fruit. This was tastefully arranged on three tables, running through the hall, and presented a magnificent appearance. The Northfield collection consisted of 275 plates, and the Hatfield collection 175 plates. The collection from

Sunderland, 150 varieties and 160 plates. Hadley sent 43 plates, North Hadley 42 plates. E. H. Judd of South Hadley exhibited 25 varieties of pears. Henry Dikeman of Northampton had on exhibition a large variety of grapes, pears, and peaches. H. C. Comins of North Hadley made a splendid display of twenty-six varieties of canned fruit and 11 varieties of jelly.

The exhibition of vegetables was a good one. W. L. Warner of Sunderland, and H. C. Comins of North Hadley, were the principal contributors,—158 varieties in the former, and 87 in the latter. Mr. Comins exhibited a lot of corn, which he estimates to yield at the rate of 105 bushels of shelled corn to the acre,—a result which he attributes to the virtues of the Stockbridge fertilizer.

There were several mammoth squashes; the largest weighed 115 pounds. There was quite a display of centennial articles and farming implements, which added much to the show. This portion of the exhibition was very fitting and proper on this centennial year. One Bible, 277 years old, was worthy of note, containing the record of the Clark family, shown by Calvin W. Phelps, whose wife is a member of that family. Mr. Stebbins, President of the Society, brought down from Deerfield an old-time sleigh, made for a single person, and, probably, used by the village doctor more than 100 years ago.

There were several lots of butter on exhibition,—gilt-edged, and tastefully moulded, which spoke well for the farmers or farmers' wives of the county. Every sample of butter was accompanied with a statement of the method by which it was made.

The cheese of the county was absent.

Of bread there was a large contribution, and if the inside of the loaves tasted as well as the outside looked, it certainly would be all that could be desired.

Of fancy articles there were 154 entries, consisting of bed-quilts, rugs, lamp-mats, paintings, drawings, shell-work, wax-flowers, and tidies of all descriptions; and a multitude of other articles, too numerous to mention.

This Society is one of the oldest in the State, and is located as it were in the garden of New England, owning a fine park and a commodious hall, with a slight embarrassment or debt of about $5,000, which, I hope, they will be able soon to wipe out. The officers of this Society seem to be live, energetic men, and bound to succeed.

In closing this report, I feel under obligation to the President and other officers of this Society, for their attentions during my stay with them.

Daniel Dwight.

HIGHLAND.

The annual show of the Highland Agricultural Society was held at Middlefield on the fourteenth and fifteenth days of September.

The first day the weather was fine, and the number of people in attendance compared favorably with previous years.

About 200 cattle were on exhibition, consisting of thoroughbred, grades, and natives,—all in good condition, especially the working-oxen, which had received unusual care and attention.

The drawing-match was a severe and exciting contest, and was won by a pair of grade Herefords, owned and driven by W. H. Hawley, of Sandisfield.

The show of sheep was larger than usual; that of swine small, but it included some animals of marked excellence.

In the hall was to be seen the usual display of domestic manufactures, paintings, and fancy-work, samples of butter, cheese, maple sugar, and grain. Also a generous share of fruit of all kinds which can be grown in the vicinity, and an abundant supply of vegetables.

The exhibition of potatoes made by Mr. C. C. Thompson deserved and received special attention. There were more than 20 varieties of his own growing, and among them the native South American, which the contributor said was the original stock from which all our cultivated varieties came.

In the evening there was a gathering in the town hall, which was filled to its utmost capacity. President Bowen successfully called for music, song, and speeches, which kept the company in a pleasant mood till a late hour.

On the second day the exhibition continued at the hall; but the attraction of the day was the collection of horses on and about a rough, uneven, rocky track, where a large number of fine animals, representing all classes, were to be seen, and their merits discussed.

The trials of speed, which are so frequently connected with "sinful games," appeared to be conducted by the managers with an honesty and a fairness which would do credit to a board of school committee.

The annual address was made by L. H. Gamwell, Esq., of Pittsfield, and was a strong plea for industry, economy, and simple tastes. At its close, the Secretary of the Society read the list of premiums, and the Treasurer paid the awards.

This cattle-show day is the gala day of all the year for the people of the country round about. The farmers come and bring their families, and all make the most of it now, and look forward with pleasure to the next meeting.

In my judgment this Society promotes, very materially, the interests of agriculture in the district of its location.

STEPHEN SHEPLEY.

HAMPSHIRE.

"Rain, of course," was the general sound from lips of all interested in the show at Amherst on the first day of the exhibition; but the ardor of the workers was not dampened, for, upon arrival at the grounds, your delegate soon found he was in the region of "Shorthorns." To him it was a rare sight, for, in his section of the State, a full-blooded "Durham" is a *rara avis.* The collection was large, and the best specimens of the breed were there in large numbers. Where so many were collected together, it would not be fair, were it possible, to say which was the best; although a breeder of, and believer in, "Jerseys" for family cows, that day sure he *blowed with Shorthorns.* Your delegate was in the care of Professor Stockbridge, of the Agricultural College, and those who know him will be sure that all the good points were shown, and no invidious distinction made. Long lines of noble-formed and well-cared-for oxen contentedly chewed their cud, and, obedient to the *voice* of the drivers, went over the usual course. But after a brief look at the out-door exhibit, the rain drove us within doors; and in the lower story of the building the examination of flowers, fruits and vegetables, and other collections, was made. Large collections of vegetables, very tastefully displayed, were made by Mr. W. L. Warner and others whose names have escaped my memory. The whole display was very creditable, and some portions hardly ever surpassed by any Society.

Contrary to usual custom, the Society dinner was held the first day. Your delegate, supposing it would be the second day, had made his arrangements to be absent from dinner, and reserve his speech for some very distant occasion; but he was caught, and sandwiched between Mr. President Seelye and Professor Stockbridge; so you will understand that the inner layer was very thin. After dinner, Professor Stockbridge, in a pouring rainstorm, took your delegate over the grounds, and through some of the buildings of the Agricultural College. Your delegate never before had much faith in that experiment, and in his legislative action had, with many twinges of conscience, voted for state appropriations; but as he saw what had been and was being accomplished upon the grounds and educational department, a change came over him, and his conscience was easy as to the votes he had given for state pecuniary assistance, and he believes it to be worthy the fostering care of the Commonwealth.

To one accustomed in his daily round of life to look upon level fields, with poor soil, the eye would seem never to tire viewing the hills and valleys of Amherst and vicinity; and your delegate brought away with him a pleasing recollection of the apparent success of the exhibition of the Hampshire Society, and the beauties of Hampshire scenery.

John A. Hawes.

HAMPDEN.

The undersigned, appointed to visit the Hampden Agricultural Society, reports that business prevented him from attending but one day of the thirty-second annual exhibition of the Society, which was held at the city of Springfield on the third and fourth days of October last.

The day was pleasant, and everything, so far as depended on the weather, was favorable for the occasion.

Your delegate considered that his duty consisted in making, so far as appeared to him, an accurate report of the above-named exhibition to the Board. First, there was an extensive show of agricultural implements; these were shown on the grass near the grand stand, and the gentlemenly owners and their assistants were constantly showing and explaining their particular points to all who desired to know about them.

In the pens there were about two hundred animals, including four pair of oxen, eleven pair of steers, and a few sheep. Colonel James Thompson exhibited 27 grade cows,—all very fine animals. H. M. Sessions had a herd of Devons. Phineas Stedman & Son, W. R. Sessions, and Ethan Brooks, herds of Shorthorns. The steers were well matched, handy, and docile. The above-named animals, taken as a whole, would be a credit to any society in the State.

Now, the other side of the story is, that the cattle are only required to be on the grounds four or five hours of the first day; no properly sheltered pens are provided to keep these fine cattle comfortable during a storm, or to shelter them from a burning sun; and it appeared to me so strange that these really fine and useful animals should be so treated, when in marked contrast on the same grounds, and, as I understand, provided from the same funds, were luxurious stalls for horses, in some cases, whose only merit is that they can trot in the twenties or thirties. This comprises what I saw at Hampden Park the first day; and, with the exception of the exhibitors and members of the committees, there were but few visitors in attendance.

In the city hall I found a show of poultry of various kinds; also, of fruits, vegetables, fancy articles from the ladies, and various miscellaneous articles. The show of fruits and of vegetables did not meet my expectations, coming from a rich valley and vicinity of a populous city like Springfield.

According to the programme, the second day at the park is entirely devoted to the horse. This, I think, is wrong. It is giving the whole of the second day—the important day, as the Society must regard it, as they do not charge any admission fee for any other day—to one interest, and giving that interest an importance that does not belong to it. Now, I admire a good horse as much as any one, but, at the same time, I trust I have a proper regard for good cattle, and other agricultural interests. What is the remedy? First, concentrate the show at one place. Second, provide sheltered pens for the stock, and have them kept on the grounds during the exhibition, not only to instruct and gratify the lovers of good stock, but if they must devote a whole day to the horse, keep the cattle to give an air of utility and respectability to the occasion. Third, make the exhibition attractive to the ladies, and be assured that if you can attract to the exhibition the intelligent ladies of Hampden County, you will have no reason to complain of the want of attendance of the men.

John B. Moore.

HAMPDEN EAST.

The twenty-fourth annual exhibition of this Society was held Thursday and Friday, September 21 and 22.

The chill autumnal breezes of the first day may have detracted somewhat from the exhibition, but the effect was more in the line of sight-seers than with contributors, or seekers after knowledge.

There appeared to be a good degree of interest in each of the several departments of the fair, and it would be difficult to select one in which there was not considerable competition.

Among the pure-bred animals, there were 31 Ayrshires from the State Primary School, exhibited by Dr. Wakefield of that institution; 20 very fine Devons entered by Mr. H. M. Sessions of

Wilbraham, a former member of the State Board of Agriculture, and Mr. A. C. Burleigh showed both Jerseys and Durhams.

In addition to these, there were several herds of high grade animals, which showed the exercise of good judgment in breeding and skill in feeding.

There were swine in abundance, of the finest type; one litter of nine, six months old, averaging 250 pounds each, exhibited by Mr. Collins; also two litters from the State Primary School, which were among the best specimens of porkers we often find.

Mr. J. K. Knox exhibited 38 Cotswold sheep, Dr. Wakefield 11, and other exhibitors made up an excellent show in this department.

The show of poultry was very good, much better than at some former fairs of the same Society.

In the hall everything was properly arranged, and each article could be easily found by the examining committee, which cannot be said of all exhibitions.

Fruits were exhibited in abundance; H. M. Sessions and A. B. Howard were perhaps the largest contributors, yet other parties showed very fine specimens of several kinds.

Vegetables were plenty, and most of them of a very fine quality; also seed-corn of several different varieties.

Cut-flowers, handsomely arranged, were exhibited by a number of contributors; among which was Mr. A. B. Howard of Belchertown, who showed 150 of his 2,000 varieties of verbenas.

The exhibition of bread, butter, cheese, wine, and canned fruits was good, and in the class of domestic manufactures there were many articles of real merit.

There was about the usual number of entries of agricultural implements and machinery, consisting of mowing-machines, stump-puller, etc.

If we compare the contributions of to-day with those of the first annual fair of the Society 24 years ago, we shall be convinced that good progress has been made, and the money given by the State has been judiciously expended.

LEVI P. WARNER.

FRANKLIN.

A report of the doings of the Franklin Society, to be commensurate with the occasion, would not be in accordance with the expressed wish of the Board; *i. e.*, concise.

The Society held its twenty-seventh annual exhibition in the new park, situated nearly a mile from the centre of the town of Greenfield, upon an elevated plateau of ground, which seemed to be well chosen and naturally adapted for these exhibitions. The grounds have been put in good condition, with a half-mile track. Buildings, sheds, and pens for stock, and a grand stand to witness the exhibition of horses, have been erected. Beneath the stand is a large hall, with other rooms desirable for the wants of the Society. A beautiful grove of trees occupies the northerly portion of the grounds, affording shade as well as shelter, and certainly a charming, as well as a useful, feature in the park. Good weather, which is always requisite to the best success, favored the Society, and the enthusiasm which is enlisted by new grounds and buildings, brought to the fair a large attendance of people.

Cattle, horses, sheep, swine, and poultry—and all these of superior excellence, well worthy the pride and ambition of their owners; and good specimens as well as herds, of nearly all the pure breeds,—were on exhibition. Farmers brought, with commendable pride, the breed which seemed to them best adapted to their respective wants, and we are informed that the pure breeds are yearly increasing at exhibitions. There were also grades of the several breeds, which, for all purposes (except breeding), seemed to meet the wishes and wants of their owners. The farmer who keeps and cares for stock well, is preëminently qualified to keep the higher grades and pure breeds successfully.

Horses, also, are receiving considerable attention in this section, and there were many fine animals shown; a goodly number of colts promising well; but, as far as we were able to learn, horses for speed were receiving the most attention. And the horse for business, and those adapted for general use, are becoming scarce, and are supplied from the West. Sheep were shown in goodly numbers, and many were superior, judging from their mutton and wool qualities, and their breeding seems intelligent on the part of the owners.

The show of swine was not only quite large, but of high merit,—blood tells in swine as clearly as in other stock.

The poultry was a prominent feature of the fair. There were upwards of 150 entries, nearly all of the pure breeds; and the pens contained birds of rare excellence. We have seldom, if ever, seen a better display of poultry at an agricultural fair.

The town hall contained the exhibition of fruits, flowers, vegetables, grains, articles of domestic manufacture, paintings, and almost every conceivable article both for ornamental and domestic use. The hall was the centre of attraction in the evening, being filled with people who were highly entertained, not only by the exhibition but by vocal and instrumental music. The display of fruits was an attractive and interesting feature of the exhibition. Apples and pears were shown in great variety, comprising all the well-known sorts, and some of local origin which were promising. Grapes were abundant, and some new seedlings were very fine.

The cereals were very prominent, the corn being displayed in traces that were truly imposing. The vegetables were in good condition, were true of their type and sorts, and but few were overgrown.

The exhibition in the hall was of high order of merit, most admirably arranged, and interesting and instructing to all. If we are to judge the farming interests of Franklin County by the show of live-stock and products of the farm as we saw them on exhibition, we must conclude that a high course of agriculture is pursued, at least by those who exhibit their products and live-stock at the fair of the enterprising Agricultural Society of Franklin County.

O. B. Hadwen.

DEERFIELD VALLEY.

This enterprising Society was fortunate, "as usual," in having two pleasant days for their sixth exhibition.

On arriving at the ground rather early on the morning of the first day, I found the President, Mr. David L. Smith, at the gate, active in assisting and giving directions, and, during my stay, I was pleased to observe the readiness and efficiency with which the officers discharged their various duties.

Concerning the interest taken in the Society, it may be sufficient to say, that there were entries of 200 head of neat-stock, 275 of sheep, and 110 of horses and colts. Of swine, there were 8 entries. Of poultry, 20. In the hall, 503. Other departments, 29. Two hundred and sixty persons received premiums and gratuities. Notwithstanding the severe drought had left its mark on much of the stock, still the exhibit was creditable to the Society.

Of the classes of neat-stock, perhaps the most noticeable were the oxen and steers,—good, straight, well-bred and well-kept animals. Some yearling steers, by W. S. Williams, and Thompson and Hillman, were well worthy of the prizes they received.

The town of Heath provided the only town team,—sixteen pairs of very fair-looking oxen.

The entries of pure-bred bulls and cows comprised five animals in each class, some of them good specimens of the breeds they represented.

Dairy-cows—entered as such—were not quite so numerous as I expected to see at a show of this Society, yet there were a number that appeared to be well bred and good milkers.

Among the other classes of stock were many valuable animals.

The pens allotted to sheep were well filled with the breeds known as fine, long, and middle woolled, and grades. A considerable number of the flocks were very superior. This section of the State appears to be well adapted to sheep husbandry, and judging from the exhibition of sheep, it should be profitable.

The show of swine was small, but good.

Poultry was represented by most of the prominent breeds.

The exhibition of trained oxen and steers was, as it deserved to be, one of the attractive features of the show. At the drawing-matches, the stone-boat, or drag, was used, which does not afford a chance to test completely either training or fitness for various kinds of work. The trials showed that the animals did the best they could, and were willing to try to do more. But on account of the excessive loads, we regret to say that, in our opinion, this part of the exhibition was hardly creditable to the Society.

The display of fruit, vegetables, and grains was good.

Some excellent samples of butter and cheese were shown, but the fame of this region for butter-making had led us to expect a sharper competition for the prizes.

The ladies' department, in addition to an abundance of good, wholesome bread, contained many things that required care, patience, skill and industry to produce. The offerings indicated that the ladies were not unmindful of the prosperity of the Society.

In the youths' department were numerous contributions, possessing merit, and giving evidence of much that is hopeful for the future.

The address of G. T. Barker, Esq., of Pittsfield, was an eloquent effort, in which the orator alluded to those well-worn subjects, the importance of agriculture, and the felicities of a farmer's life.

The exhibition of horses on the second day brought many fine animals to the grounds, with the usual gathering of eager spectators. At the trials of speed, and at the other trials, where to "go" was not regarded as so much importance; the drivers, ladies and gentlemen, lads and misses, showed much address in management, and a commendable consideration for their horses.

As might be expected from the favorable weather, the energy of the officers, and the interest manifested in the Society, the fair was, financially, satisfactory, and we think that the endeavors of the "executive committee to keep up the credit of the Society for a well-balanced cattle-show and fair," were reasonably successful. Our associate, Mr. C. E. Hawks, and his estimable lady, have my sincere thanks for hospitality and kindness shown me.

A. H. Holland.

BERKSHIRE.

The sixty-seventh annual exhibition of the Berkshire Agricultural Society was held October 3, 4 and 5, upon its own grounds, pleasantly situated in a delightful valley lying among, or close to, the Green Mountain range, whose hills were covered with the bright autumnal leaves, making it one of the most beautiful places the eyes ever rested upon.

The weather was what would be called "cold, cloudy weather"; not what the officers and members desired. Where a Society gives so liberally in premiums, and depends upon its receipts, it needs at least one pleasant day. Yet the Society is strong and well managed, and there is no danger but that it will always make a creditable show, in its finances as well as in its public exhibitions.

The Society is the first that ever awarded premiums, and from its commencement it has increased steadily and surely; to-day it is one of the best-managed and strongest societies in the State.

The exhibition, I was told, was not up to some of the former displays, yet it was good. I cannot well designate the contributors' names, or the articles upon exhibition, although there were many entries worthy of mention.

The exhibition of neat-stock was quite large, and many valuable animals were exhibited, among which were the Holsteins, which appear to have a strong hold with the farmers of Berkshire. Durhams, Devons, Alderneys and Ayrshires, were exhibited in good numbers, all having their warm friends.

Milch cows, sheep, and swine were well represented, and were an attractive part of the exhibition.

Poultry was well represented, showing many fine birds. The Society will see the need of having platforms, so that fowls can be shown to better advantage.

The exhibition of horses was good, both in quality and in number, showing that the people are interested in raising and using good horses.

The hall was full, too full to show to advantage. The vegetables were of the best kind. I have never seen so many well-ripened vegetables at any exhibition. Butter and cheese were also the best I have ever seen. They all showed evidence of labor and care, and were attractively displayed.

The display of fruit was not large, hardly what I should expect, from the abundance of the present year. The fruit was shown under glass, in unoccupied spaces about the hall, and in that manner could not be displayed to advantage.

Much credit is due the ladies. Their department was full and complete, and had suitable space been allowed them to exhibit their work, they could have made one of the finest displays ever seen; I will not except that in the ladies' pavilion at the Centennial.

The Society will see that some few additions could be made to advantage, such as platforms for poultry, and some little additions to the hall; also in the arrangement of stock by placing each class by itself. However, with all the little faults, the officers and members may congratulate themselves upon their success, as their exhibition is among the best in the State.

Thanks to the officers for their cordial attention while with them.

W. L. Warner.

HOUSATONIC.

By a mistake for which your delegate, or some other person, was accountable, he did not learn of the time of the Housatonic exhibition until he saw the account of the first day's work in the paper. Making the most of the time that remained, he visited the grounds on the last day of the fair. From the large number of people present, and the evident satisfaction which all persons interested in the work manifested, your delegate has good reason to think that the exhibition was an entire success, as securing the purpose for which it was held.

Many relics of revolutionary times were on exhibition, showing the great advance made in the last century in all that pertains to the improvement and comfort of the people.

In the afternoon, a very able address was delivered by H. J. Canfield, Esq., of Stockbridge. Your delegate was forced into this service, also, as he generally is,—a fact that would have been passed over in silence, were it not that he wishes to compliment the Society on the admirable arrangement which they always make for the speakers on such occasions,—a pleasant contrast to the miserable disorder which prevails in some societies, where there is comfort for neither speaker nor hearer.

Although regretting his ability to give a detailed account of the agricultural products, your delegate has nothing but good words for the Housatonic Society.

P. A. Chadbourne.

NORFOLK.

At the request of Dr. Loring, he being absent at the Centennial, I make this report to the Board.

The twenty-eighth annual exhibition took place on the 28th, 29th and 30th of September. The weather was pleasant on all three days. The exhibition, in all its departments, was fully up to the standard of former years. All the cattle-pens were filled with animals creditable to the Society.

The show of swine was very superior in all respects.

The show of horses, probably, never was excelled at any county exhibition within the State.

Fruit, vegetables and flowers were in profusion, and of a high order.

The ladies' rooms were well filled with their handiwork. There were forty entries of bread and butter, and poultry in great variety.

Shaw & Brother of West Roxbury exhibited a newly invented swivel-plough that drew the attention of farmers, and received the first premium on the field.

A pair of beautiful twin heifers, Jerseys, two years old, with calves by their side, from the Blue Hill Stock Farm, wàs admired by all.

Gentlemen: The record of this Society for twenty-eight years stands to-day without a blemish. Much of the seed sown is bearing fruit to the honor and interest of the community, and of the noble State that has given her her fostering care. Whatever her destiny may be in the future, the charge of meanness cannot be laid to her door, either to her patrons or to her sister societies. Her fault, if any, has been in bestowing too liberal awards and in her management, and if any are to suffer from her misfortunes, it will not be the State or the community, but individuals of the Society.

ELIPHALET STONE.

BRISTOL.

The report of the Bristol County fair last year, from the fertile brain and pen of the talented delegate, was so ornate in its descriptions and exhaustive in its delineations, that I need say but little more than that the show this year was regarded as quite the peer of that in several departments one of peculiar excellence, and as a whole, equal to any of its predecessors.

But for other pressing duties, I should have been upon the grounds promptly the first day. Arriving on the second, which is the great day, I learned that the ploughing took place on the first, that a large number of teams competed, and that the work, which was in sward land, was well done.

Inside of the hall, the vegetables, grains, fruits, flowers and needle-work, were in profusion, of fine qualities, and advantageously displayed. Crayon-work, paintings, shell-work, sewing-machines, carpeting, silver-plated ware, a counterpane with 81,988 stitches, made in three weeks, by Mrs. Mary Turner, a lady seventy-two years old, and various other nice articles, had been contributed. Implements of husbandry of improved styles, the products of the foundry and of the cotton mill, carriages, and specimens of finely wrought marble, were not wanting. Bread, butter, and cheese were to be seen as usual. The hall is large, and it was well filled. Altogether it was a fine exhibition.

Outside there was an excellent show of stock of several of the thoroughbred classes; it is said there were over 200 head in all. Town teams were there in considerable numbers. The show of horses was pronounced the best the Society has ever made, both in the number and the value of the animals shown. There were splendid males; and the brood-mares and colts were in such numbers as to demonstrate that the farmers in Bristol County did not mean to depend upon Canada and Vermont for a supply of good horses. One of the reporters present said, that such was the display of swine, it was "enough to drive a Jew crazy with horror." Certainly the Essex specimens were about as near our ideal of perfection, in this kind of animal, as we could expect to see.

The sheep were good-looking, and the feathered tribes were very numerous and of multitudinous varieties,—some fancy and some otherwise. There were fine arrangements for the accommodation of all.

At the proper hour we were ushered into the upper hall by the stirring music of the Lyceum band, and found ample tables spread with good things for the inner man. At the conclusion of the repast, the band and chairman upon the platform, called attention to the speaking. Edward L. Pierce, Esq., of Dorchester, who was the orator of the day, gave a very excellent and timely address on the necessity of making the farmer's calling more attractive. The greatest fault of the address, if fault there were, was that it was too short. This, however, was attributable not so much to the speaker as to the audience, who were leaving their seats at the tables almost continuously from the beginning to the end of the address; hurrying out to be present in season at the "Polo" on the race-grounds; so that, after the distinguished gentleman sat down, and your humble delegate was called upon for some remarks, the number of persons remaining, in addition to the gentlemen upon the platform, was so small, that there was a very obvious reason for brevity.

The "Polo" came off, viewed by the multitudes, interrupted for awhile by a shower of rain, although the day, on the whole, was very favorable. It was estimated that during the day there were nearly 15,000 people upon the grounds, a few of whom, I judged, had access to a beverage somewhat stronger than pure water; but in general, good order prevailed. Some trotting on the course took place after the play, and the third day, as I learn, was mainly given to performances of the same.

The Bristol is one of the old and strong societies of the State, this being its fifty-third exhibition. This last affords abundant evidence of the continued vigor of the institution, and contributes its quota of proof that in New England agriculture is still vital and progressive. Its finances are in good condition, the amount of awards large, and there can be no doubt that the Society is well worthy of the continued bounty of the State.

It is but just that I acknowledge the kind attentions of gentlemen connected with the fair, especially those of Judge Bennett of Taunton,—our brother member here,—of our old friend and co-laborer, Mr. Slade of Somerset, and of the Secretary of the Society, Mr. Rhodes of Taunton.

H. VINCENT.

BRISTOL CENTRAL.

I had the honor of attending the agricultural exhibition of the Bristol Central Agricultural Society, at Myricksville, on the 13th and 14th of September last, and saw much that was enterprising and commendable, and some things that were very novel.

The Society has ample and commodious grounds and buildings for its exhibition, and everything seemed convenient and substantial; but the sparse population in its vicinity, and the dry and comparatively barren appearance of the surrounding country, led me at first to exclaim, Where are the people coming from? Nothing but a single track, and a small railway station near, seemed to warrant the large outlays made on the park there, and even the potency of the little railroad looked doubtful. But on further acquaintance and inquiry, I found that the Bristol Central was rightly named. On the one side lies busy Taunton, and on the other the factories of Fall River, about seven miles equidistant from Myrick's, while New Bedford, fifteen miles to the southward, brings up the rear, and, perhaps, foots some of the bills, and furnishes the means of lubrication. Captain Hawes of Fairhaven, an experienced navigator and amateur farmer, fitly occupies the wheel-house of this Society, and, like Palinurus of old, it is believed, is safely steering this craft between the Scylla and Charybdis of hard times, into the large, open sea of improvement and success.

The exhibition opened with a ploughing-match, in which there were thirteen competitors, half of them driving oxen. The lands were an eighth of an acre each, to be ploughed inside of fifty minutes by the oxen, and forty minutes by the horses; but the ground was too dry and baked to show good work.

There was a good show of cattle, chiefly of the Alderney and Ayrshire persuasion. The sleek and portly Shorthorns, which so largely make up the exhibitions of Western Massachusetts, were wanting. A few thin specimens of this breed from Bridgewater were the only ones we noticed. The fearful drought, which was at its height at the time of this exhibition, doubtless had considerable to do with the appearance of the stock and the scarcity of this particular breed. The City Farm of Fall River, and the Riverside Stock Farm of West Bridgewater, sent thither large and creditable herds.

Half a dozen pens of sheep, and nine of swine, the former largely Southdowns, and the latter Chesters, furnished the attraction in these departments. The City Farm of Fall River was accredited with two porkers, weighing respectively 940 and 560 pounds live weight, with fat enough on them to satisfy a moderate pauper.

The show of poultry, 140 coops strong, was very creditable, and the breeds were of the more fashionable and fancy kinds.

The horse exhibition was comparatively good, but decidedly leggy. A few breeding animals and good colts were shown, and some stylish carriage-horses. But the offer of $180 in premiums for speed the first day, $185 the second day, and $405 the third day, made the sports of the turf preëminent.

The display of the premium stock on the track, with badges, indicating their rank, while the crowd halted in front of the grand stand to hear the awards read by the president, was to our mind one of the chief attractions of the occasion. First came the marshals mounted; then the New Bedford Band, in which were four buglemen that followed General Sherman in his matchless march to the sea; then sixteen horses led by grooms; then eleven bulls of various ages; then six yoke of oxen on a single cart, ornamented and overhung with vegetables; then four specimens of fat cattle; then milch cows and heifers; then the steers and baby calves; and lastly, a pair of large draught horses finished the enchanting picture. The animals were not allowed to depart immediately, as is the case in some societies, but were remanded to their stalls and pens to await further and closer inspection from the public, which was to us a novel and pleasant opportunity.

The hall exhibitions were like those of many other societies, meagre in spots, and ample where you would least expect them.

The centennial department, by which is meant the display of antiquities, was very large and interesting. One gentleman from Taunton got together 146 articles of this kind, and he had several rivals.

The ladies showed their hands nobly in various departments, of which mankind are supposed to know but very little.

As a whole, we should say the exhibition was well worthy the bounty of the State, and highly creditable to the people of Bristol Centre, and the improvement and elevation of the masses by it are not to be computed. The loss of the late Dr. Durfee is deeply felt by this Society, and fortunate will it be when another benefactor like him arises.

The committee on flowers fitly said :—

> "The brilliant contributions of the late lamented ex-president and devoted friend of our Society, Hon. Nathan Durfee, for the first time in the long series of our annual exhibitions, have ceased to add lustre to the display of fruit and flowers which he loved so well.
>
> "The vacant space which he would so nobly fill if living, is more eloquent in its pathos than any words of eulogy which your committee could bestow. Though we may never hope to rival the exquisite displays which alone ensured the success of this department, their memory will serve as a perpetual incentive to emulate his example."

J. N. BAGG.

PLYMOUTH.

The fifty-seventh annual fair of the Plymouth County Agricultural Society was holden at Bridgewater on September 20, 21 and 22. Your delegate arrived on the grounds of the Society on the first day of the fair, while a cold north-east storm was prevailing, and everything looked cheerless indeed for a successful show; but events showed that the Plymouth County people were not to be debarred from the pleasure of their annual holiday from fear of threatening clouds or damp feet. The Society have one of the best-arranged halls for holding exhibitions there is in the State. They expended within the last year, some eleven or twelve thousand dollars in enlarging and improving their hall. It is situated on a slight eminence over-looking their grounds of fifty-five acres, with a beautiful grove on one side. It has a basement for the reception and exhibition of agricultural implements. On the ground-floor is a large, well-arranged hall for the display of the products of the farm, the dairy, the workshop, and the ladies' department. On the floor above, they have a large, commodious dining-hall, and a reception-room for holding society meetings, etc.

The exhibition of fruits, vegetables, and the dairy were very creditable.

The ladies are entitled to great praise for the magnificent display of flowers. It was one oblong pyramid, reaching nearly the length of the hall. It was just splendid.

The ploughing-match took place on the first day. There was quite a competition for the honors of that department. There were seventeen entries for the match,—eight of ox and nine of horse teams, with different patent ploughs. The ploughmen understood their business, and did good work, showing the great improvement that has been made in the plough, and its work, in the last sixty years. There is no part of the farm-work of more importance than good ploughing. When well done, there are many points gained towards a successful crop.

There was a good display of cattle, horses, sheep, swine, and poultry. Among the cows, the Jerseys were the most numerous. Owing to the excessive long drought, the cattle in general were not in good show condition. The storm continued through the second day, but there was quite a good attendance of people. At the hour for dinner, there was a tolerably good assembly gathered round the festive board. After which good cheer prevailed, and humorous speaking by members of the Society and invited guests.

On the whole, we think the old Plymouth County Society is among the prosperous ones of the State. I hold in pleasant remembrance the reception and attention given me by the officers of the Society, and the kind entertainment I received in the pleasant home of Mr. J. E. Crane and his lady.

Milo J. Smith.

HINGHAM.

The eighteenth exhibition of the Hingham Agricultural and Horticultural Society was held at Hingham on the 27th and 28th of September, 1876, and, in many respects, it compared favorably with those of any former year. The weather was propitious, and the management such as to attract a large attendance. The first day was principally occupied in arranging the products in the hall for the full exhibition on the succeeding day.

The interest which attaches to this Society is such as to render it always one of special attention. Its record is one of unusual value, from the fact that its early founders and patrons were men who attached large importance to agriculture, and aided in applying their intelligence and industry to the soil.

The entry-books gave assurance of a most successful exhibition in all departments. The hall was opened to the public at an early hour, and presented an attractive appearance. Notwithstanding the severe drought of the summer months, the apples were large and plentiful, and those exhibited by Fearing Burr, Amos Bates, Albert F. Whiting, Andrew Cushing, Jeremy Murphy, Charles W. Cushing, and John R. Brewer, were of excellent quality.

The display of pears was large, the principal exhibitors being Mrs. Fiske, 25 varieties; Charles W. Cushing, 20; Amos Bates, 25; J. Murphy, 15; H. L. Fearing, 25. Excellent varieties were also exhibited by Albert Whiting, Alfred Loring, William Fearing, and Charles and Andrew Cushing.

The display of grapes was not so large as usual. Some of those grown under glass, however, would compare favorably with the exhibits of the State Society. Henry L. Fearing, Joshua Tower, Alfred Loring, Mrs. Sarah D. Fiske, Alexander Anderson, Andrew Cushing, and Amos Bates were among the most successful.

Tables running the entire length of the spacious hall were well filled with the products of the farm and garden vegetables. John R. Brewer, Esq., sent from his model farm, the largest collection and the greatest variety of vegetables on exhibition. They were worthy of special notice. Ezra M. Whiting had two marrow squashes, weighing 149 pounds, grown on a vine not over three feet long. William and Dana Fearing and Loring Jacob also exhibited excellent squashes. Among other exhibits were those of Henry D. Hyde, C. W. Cushing, L. R. Hall of South Weymouth, and a number of juvenile gardeners,—boys and girls,—whose industry was rewarded by nice little crops of pop-corn, potatoes, and other edibles.

The show of flowers, because of the extreme dry weather, was not large. Several ladies, however, offered designs which were very beautiful. There was a large and excellent display of pot-plants by Mrs. John R. Brewer. The ladies of Hingham always make a creditable exhibition of their handiwork in worsted and embroidery; and the cases of bread and butter and cheese attested to their skill in the dairy and kitchen as well.

Hingham takes the lead, in the Old Bay State, in the manufacture of buckets and children's wooden toyware. In this department, Corthell & Cushing occupied a considerable space. The South Shore Mills of Frederick Long & Co. exhibited fancy knit-goods in great variety.

A large room in the exhibition-hall was devoted to the exhibit of antiquities, revolutionary relics, and curiosities, in which this ancient town is peculiarly rich. This drew a large crowd throughout the day, and was one of the most attractive and interesting features of the occasion. Hon. Solomon Lincoln, the historian of the town, contributed a collection of ancient books and a pewter baptismal-basin which was used in time of Rev. Peter Hobart, the first minister in Hingham. Reverend Dr. Miles exhibited old books, printed in 1488 and 1523; pay-rolls of Capt. Fearing's company, which went to the terrible bloodless war in Cohasset, 1814; bed-quilts over 200 years old; a halberd used in the Revolution; a crayon-portrait of Paul Revere; a chair formerly belonging to John Hancock; linen napkins, spun and woven in Hingham from flax raised there; and original bills of sale of negroes in Hingham, etc.

The ploughing-match, upon the grounds of the Society, took place on the morning of the second day. The work done would do credit to farmers in any part of Massachusetts, and attracted large numbers.

The cattle-pens were well filled with some fine and well-bred stock; the entries including 25 cows, 10 bulls, 20 working-oxen and steers, and a goodly number of sheep. John R. Brewer and Daniel Cushing exhibited several pairs of well-looking working-oxen, and Charles W. Cushing his splendid Devon bull "Choctaw," two years old. Grade sheep were also shown by Mr. Brewer and James F. Leach of Bridgewater. It is evident that much attention has been given here to wool-bearing sheep by farmers who appreciate its importance.

The display of poultry and pigeons was good.

Premiums were awarded to David Cushing and Philo Leach for best draught-horses; for best Devon cow, to C. W. Cushing; for best grade cow, to Erastus Whiston; to Henry W. Burditt and J. T. Thompson, for best herd of cows. Best beef cattle, to Mr. C. W. and David Cushing. First premium on swine to Erastus Whiton for best show of fat hogs, and to Oliver L. Jones for five shoats and forty pigs.

The great outdoor attraction, on the forenoon of the second day, was the parade of the "Madawaska Cavalry," numbering about one hundred and fifty men and boys, each of whom was mounted on a tame steed, and accoutred in the most grotesque style, with old swords, saddles, and uniform coats and hats, which had, apparently, been buried in dust for half a century. The members of this corps uttered their dread war-whoop, to the great delight of the youngsters and the amusement of their elders. The command of this valiant corps devolved upon Gen. Ebed L. Ripley, supported by a large and efficient staff. After making a detour of the town, they proceeded to the fair-grounds, where they performed a series of evolutions and sham-fights for the edification of the crowd.

The annual dinner took place at twelve o'clock, a procession having been formed under the direction of Col. John C. Whiton, chief-marshal, and marched, under the music of the Hingham Brass Band, to the spacious hall. Nearly five hundred persons were seated. At the close of a sumptuous dinner, Edmund Hersey, Esq., President of the Society, presided, and in his opening remarks spoke of the display of the products of the farms, and compared the rude implements of their fathers with the improvements of the present, and said we were encouraged to persevere in the progress which has placed this country foremost among the nations of the earth. Addresses were also made by Charles G. Davis, Charles Hale, Edward L. Pierce, Gen. E. L. Ripley, Rev. Henry A. Miles, D. D., Samuel Downer, Hon. John D. Long, and your delegate, who closed with a sentiment to the "Hingham Agricultural and Horticultural Society: It has become distinguished for its agricultural and other industrial pursuits. As the farmers' home, it has become the abode of industry, peace, comfort, intelligence, and happiness."

This Society has been fortunate in securing the services of the ablest and best men for its officers, who do not fail to dispense largely of their wealth and influence to promote its interests and the interests of the county and town. The business of the Society is conducted with promptness and fidelity, and its management is such as to be a sure guarantee of success.

The President and John R. Brewer, Esq., together with its officers and members, have my hearty thanks for their kind attentions and hospitality.

S. B. Phinney.

MARSHFIELD.

It was my pleasure to attend the tenth annual exhibition of the Marshfield Agricultural and Horticultural Society on the fourth and fifth days of last October.

Arriving on the grounds at 10 a. m., of the first day, I found a busy state of preparation for the exhibition, and entries in all departments continued to be made till quite late in the day. Coming from a section of the State where stock-raising is a prominent feature in agriculture, I naturally examined the cattle, horses, sheep and swine first.

The entries of cattle seemed more numerous than usual, for several new pens were improvised to receive late and unexpected additions. The impression received from a somewhat careful examination of the stock was, that the farmers within the limits of this Society, while raising abundance of stock, are doing so in a haphazard way, or at least, with only a very partial application of the laws of scientific breeding. Yet, in conversation with prominent exhibitors, I learned that a marked improvement was apparent from year to year in the quality of premium stock; so it seems that this Society, in giving premiums to pure-bred breeding animals only, is giving an impetus in the right direction to a community who have followed, to a very limited extent, the practice of pure breeding.

On entering the hall, a most attractive display met the eye on every side. Apples and pears seemed to be literally showered down. Quinces and peaches were as scarce as apples and pears were abundant. Grapes of the common varieties were exhibited, and eleven entries of very handsome cranberries were shown by exhibitors from Marshfield and Duxbury.

The floral display was exceptionally fine, and was made doubly attractive by the offering of Mr. Alfred Phillips, representing a fountain, most happy in design and skilful in execution.

Domestic manufactures and fancy articles showed an endless variety of shapes and remarkable fertility of invention, as well as taste and skill in fabrication.

In the basement there was a display of agricultural implements, stoves, and vegetables. This last department was very full and attractive. A small section was devoted to the products of Green Harbor Marsh, and the samples of squashes, pumpkins, beets, potatoes, tomatoes, cucumbers, oats and rye, raised without any fertilizers, suggested astonishing possibilities for this famous marsh.

Through the courtesy of President Baker and Dr. Henry, I visited this marsh in company with the Doctor and Mr. Edward White, and there saw what is being done towards reclaiming those thousands of acres. From Mr. White I obtained a few facts, and saw his hay raised at the rate of 5,470 pounds to the acre; examined his oats yielding at the rate of 40½ bushels to the acre; his rye, at the rate of 34¼ bushels per acre. I saw the ground from which these crops were taken. This was the first breaking-up of the ground, and the crops were quite irregular from the difficulty of covering the seed. A load of hay from the marsh was on the ground for examination, and when fed to cattle, was eaten with readiness, showing a keen appreciation of its good qualities.

Another unusual feature of the exhibition was the collection in Antiquarian Hall of various old-time relics, forming a very respectable museum of curiosities. The Old Colony abounds in articles of this nature, and these were willingly loaned by their owners for the purpose of adding interest to the fair. The articles were, for the most part, well arranged and labelled, so that it was an easy matter to see and understand this exhibition of reminders of by-gone days. Very noticeable were the souvenirs of Webster, his trusty gun and sporting implements, the sword of Washington worn by him at Braddock's defeat, and a powder-horn bearing the date of 1756. Old books and papers were collected on a table in the centre, conspicuous among them Bibles bearing the imprint 1599 and 1619. A Greek and Latin lexicon printed at Antwerp in 1588. In a locked glass case were collected and arranged many articles of much historic value. Among these I noticed the inkstand of Peregrine White; a hammer brought over in the "Mayflower"; tongs, sugar-spoon and steelyards recently excavated from the cellar of the old Governor Winslow's house in Marshfield; a brass box bearing the date of 1497, with a cover curiously divided, suggesting some scientific purpose.

The hundreds of articles like these mentioned, and the courtesy and consideration of those in charge in explaining and adding a needed word of information, made Antiquarian Hall a very interesting, enjoyable, and profitable part of the fair.

The after-dinner speeches were introduced by President Baker, who stated that this Society, in its ten years' history, had secured a membership of 1,029, disbursed in premiums $6,500, possesses property valued at $12,820, and has a debt of $5,087.

The Marshfield Society is a standing proof that a really first-class exhibition can be maintained for a series of years, and draw large crowds, without the questionable features of the track and horse-race.

All honor to the officers of this Society, who are thus conscientiously and perseveringly maintaining a higher standard of moral excellence in the management of its fairs, than prevails in most of our societies.

METCALF J. SMITH.

BARNSTABLE.

The thirty-third annual fair of the Barnstable County Agricultural Society was held on the society's grounds at Barnstable on the nineteenth and twentieth days of September. The weather was fine the first day until near evening, when a fine shower was gladly received.

The morning of the second day was not favorable to a large attendance; it was somewhat showery, with a cool north wind. The train from the West brought but few; that from the East was well filled.

The undersigned arrived on the morning train from Boston the first day, and proceeded at once to the hall and ground of the exhibition, spending his time in examining the various animals as they arrived, and in the hall where persons were constantly arriving with the greatest number of articles and things for exhibition.

The annual meeting of the Society was held at Masonic Hall during the morning hours, and I was informed passed off harmoniously.

The exhibition of animals was not as large as your delegate anticipated. The pens were filled with 28 cows and other cattle; 7 yoke of oxen; 4 pens of sheep and 11 lots of swine. Among the cows were some fine Jerseys and Ayrshires; the Jerseys were superior animals, and their progeny bid fair to rival their dams. The oxen were of fair size and form. A fine fat ox was exhibited, weighing 1,825 pounds. One fine Jersey bull and an Ayrshire bull were exhibited; quite superior animals.

The poultry-show was small,—6 coops of hens, 3 of ducks, 2 of geese and 2 of turkeys; all very good specimens.

Of horses there were but few on exhibition; some good ones, though not calculated to attract the envy of the sportsman or the farmer.

The ploughing-match excited but little interest. Four ox-teams and one two-horse team competed for the prizes. The work was well done and in a reasonable time, considering the nature of the soil.

Vegetables.—In the hall the whole number of exhibitors was twenty-seven, many entering a large number of varieties of potatoes, onions, squashes, beets, etc. The display was a great surprise, considering the unprecedented drought of the season, and suffered but little in comparison with exhibitions in more favorable localities.

The exhibition of cereals was small; fine specimens of rye, oats and corn were exhibited.

Fruit.—The table devoted to fruit was loaded with the choicest varieties of apples, pears and grapes, all of the different varieties, and tempting to look upon, even to a modern *Eve.* Canned fruit and jellies were there in abundance. Bread and butter graced one end of the table, which, to the eye, was equal to any heretofore seen, and witnessed to the skill and judgment of the exhibitors.

In the floral department both wild and cultivated flowers were arranged with exquisite taste, skill and judgment, making the display a most attractive feature of the exhibition.

Of domestic manufactures the hall was literally filled; more than three hundred specimens were exhibited,—sewing, knitting, braiding and embroidery. Of ornamental works, there were paintings, wax-flowers, hair-wreath, shell-flowers and Sepoy work, with many pictures, not suffering in comparison with the best exhibitions.

The antiquarian exhibition, though not as extensive as expected, showed some most interesting articles, which attracted universal attention. Among them, two silver spoons belonging to the mother of Benjamin Franklin. Also a child's cradle, made from a pattern brought over on the "Mayflower," which has been in one family and descendants over two hundred years, with other and numerous articles of interest.

There were some fine musical instruments on exhibition, and agricultural implements, especially the strawberry cultivator.

After a careful examination of all things in the hall, dinner was announced in the upper room, where plates were laid for about four hundred guests, and all were filled.

The dinner, where Hon. A. T. Perkins, President of the Society, presided, was a good one for the occasion, as all who partook will attest. After the dinner, which was a most social one, the doors of the hall were thrown open and filled to overflowing with an anxious crowd to listen to the addresses of the Hon. Geo. A. King and others.

It was with great regret your delegate was compelled by indisposition to leave before the address was closed. The undersigned would here express the great pleasure and instruction he derived from his attendance, and especially to Hon. S. B. Phinney and Dr. A. Eldridge, to whom he is indebted for a ride through the village and to his delightful home in Yarmouth, where he had the pleasure of spending a pleasant hour, are his thanks due. The great interest manifested by all who attended gave assurance to the undersigned that a bright future awaits the Society.

D. B. Fenn.

NANTUCKET.

The twenty-first annual exhibition of the Nantucket Agricultural Society was held on the 6th and 7th of September, it being about three weeks earlier in the season than last year.

On account of a change in the time for the steamboat to leave Wood's Holl, I did not arrive at Nantucket until four o'clock in the afternoon of the first day of the fair. The President of the Society, Andrew M. Myrick, Esq., met me at the landing and took me in his carriage to the fair-grounds, about one mile from the village, where I found that the officers of the Society had detained the cattle, sheep, swine and poultry, that I might see what a good show of stock the Nantucket Society had on exhibition.

There were some good cattle of several different breeds entered for premium, but owing to the very dry season, the cattle were rather thin in flesh. There were some fine Jersey and good Ayrshire cows, that were well worthy of notice.

The stock was well arranged and convenient for committees and spectators to examine.

There were entered for premium ;. Of the Jersey breed, 6 thoroughbred cows, 26 grade cows, 8 heifers, 3 bulls. Of the Ayrshire breed, 4 thoroughbred cows, 17 grade cows, 12 heifers, 4 bulls.

Of native stock there were 26 cows, 9 heifers, 3 yoke of oxen, 5 pair of steers, 48 swine, and several sheep. Also a number of coops of poultry.

The ploughing was on the enclosed grounds, the first day of the fair, comprising three horse-teams and two ox-teams, and was well done.

During the day, the Athenæum Hall was being filled with fruits, flowers, fancy articles, household manufactures, bread, honey, butter, vegetables, etc., for the premiums offered by the Society. The hall was finely decorated by the ladies, with appropriate mottoes hanging on the walls. The evening was devoted to the examination of the many articles entered for premium by the ladies. The hall was filled with people enjoying the holiday of the year by a good social time.

There were a large number of entries in the different divisions of household manufactures, all of which were worthy the prizes offered by the Society. Some fine specimens of carved work were exhibited by James W. Folger.

The exhibition of fruit was not as large as it probably would have been if the fair had been two or three weeks later in the season. There were five entries of butter, all good.

The vegetables occupied a good space in the hall, and all of them were well worthy of the premiums offered by the Society.

The music furnished for the occasion did its share towards making a perfect success of the fair.

The second day was devoted to the show of horses. Five entries of mares and colts ; 5 of colts ; stallions, 1 entry. Family-horses, 7 entries ; draught-horses, 3 ; walking-horses, 2 ; trotting-horses, 2. The most of which were fine animals.

The people assembled again at the Athenæum Hall in the evening of the second day of the fair for another social interview, which was enjoyed by all present. The ladies are deserving of great credit for the large exhibition of household manufactures, flowers, etc., nicely arranged in the tastefully decorated hall.

The officers and members take great interest in the Society. It really is the holiday of the year with them, and a majority of the inhabitants on the island lend a helping hand for the benefit of the Society. The weather has been pleasant, and the fair has been one of success, in every respect.

Thanks to Andrew M. Myrick, Esq., and lady, and Alexander Macy, Jr., President and Secretary, for their kind attention to me while in Nantucket.

John E. Merrill.

MARTHA'S VINEYARD.

The annual cattle-show and fair opened Tuesday, October 3, for the celebration of its nineteenth anniversary.

Producers from all sections came together to present their choicest products for each other's inspection, and compare the results of their year's labors.

The season has been a trying one for the farmers, and no one expected the show of this year would be quite up to the average, and, probably, in many respects it was not. But the display was, nevertheless, very creditable.

The first day was assigned for the show of cattle, sheep and poultry. The entries of cattle were as follows: herds, 4; working-oxen, 6 pairs; cows, 26 (of these, 16 were grade Ayrshires); fat cows, 5; young cattle, 27. The animals exhibited were, for the most part, quite inferior in quality. But the shortness of hay-crops and pasturage for the past two seasons is, doubtless, sufficient to account for this in part. Still there were some specimens worthy of mention; namely, a fat cow entered by Herman Vincent, and a pair of working-oxen by J. Allen; some very good three-year-old. steers, by John Johnson and Elliot Mayhew; milch cows, by William Cottle and T. Whimpany.

The show of sheep was very good, there being 6 entries of bucks and 81 of ewes and lambs.

The show of poultry is seldom equalled at a county fair, there being 16 coops, composed of Light Brahmas, White and Brown Leghorns, Hamburgs, Bantams, and grades. One coop contained 22, and none less than 6.

The products of the field and garden were excellent; a few specimens well worthy of mention. Such, for instance, are some large pumpkins, shown by some eight competitors; some winter, Hubbard and other squashes,—one weighing 44 pounds; some watermelons,—one weighing 33 pounds, being one of 8 grown on one vine, and whose aggregate weight was 176 pounds.

The show of corn was very good.

Apples, pears, grapes, cranberries, quinces, potatoes, onions, beets, carrots, turnips, cucumbers, peppers, and other articles too numerous to mention, found a place upon the fruit-tables.

The different kinds of domestic manufactures and fancy articles exhibited by the ladies (the work of their own hands), gave the best evidence of their qualifications to discharge their duties as prudent, faithful, and industrious housekeepers. This department was truly a success.

In the evening, a grand concert, under the direction of Prof. G. C. Wheeler, was given, which was numerously attended and heartily enjoyed.

The second day there was quite a large number of entries of horses and colts in the different classes, and about twenty premiums awarded.

Believing, from the best evidence we could obtain, that the show for the third and last day would be a success, we took our leave of our Vineyard friends. And to the officers of the Society our acknowledgments are due, and most cheerfully tendered, for their courteous attention during the fair.

F. C. Knox.

FINANCES OF THE SOCIETIES.

SOCIETIES.	Amount received from the Commonwealth.	Income from permanent fund.	New members and donations.	All other sources.	Receipts for the year.	Premiums offered.	Premiums and gratuities paid.	Current expenses for the year, not including premiums and gratuities.	Disbursements for the year.	Indebtedness.	Value of real estate.	Value of personal property.	Permanent fund.
Massachusetts, . . .	-	$6,163,91	-	-	-	$3,000 00	$1,000 00	$368 21	$4,137 79	-	-	$76,982 47	$76,982 47
Essex, . . .	$600 00	1,807 06	$369 00	$1,051 05	$3,827 11	3,170 00	1,653 75	2,360 98	4,372 98	-	$8,000 00	17,713 02	24,790 30
Middlesex, . .	600 00	-	73 00	2,388 42	3,061 42	2,154 50	1,077 75	782 01	2,870 32	$18,000 00	25,000 00	300 00	8,000 00
Middlesex South, .	600 00	-	104 00	1,984 16	2,688 16	*1,423 00	755 75	1,932 41	2,688 16	10,900 00	18,000 00	-	7,100 00
Middlesex North, .	600 00	250 00	53 00	647 44	1,550 44	1,365 00	763 37	680 26	1,443 60	2,000 00	20,000 00	2,000 00	20,000 00
Worcester, . .	600 00	-	55 00	5,666 19	6,321 19	1,618 00	1,062 99	5,255 86	6,318 85	39,000 00	100,000 00	1,000 00	62,000 00
Worcester West, .	600 00	-	80 00	2,195 48	2,875 48	2,080 00	1,724 66	1,158 66	2,952 23	2,990 90	12,500 00	600 00	10,109 10
Worcester North, .	600 00	-	390 60	1,926 58	2,917 18	947 25	625 00	2,426 34	3,051 34	11,850 00	14,000 00	50 00	2,400 00
Worcester N.-West, .	600 00	-	40 00	2,789 13	3,429 13	1,637 00	1,300 94	1,749 03	3,749 97	9,022 47	15,000 00	1,200 00	7,077 53
Worcester South, .	600 00	1,150 00	81 00	3,769 26	3,850 26	1,494 75	1,240 50	1,561 84	3,618 59	4,243 50	12,500 00	1,400 00	9,800 00
Worcester So.-East, .	600 00	-	148 00	3,288 02	4,036 02	1,314 00	661 45	3,047 00	3,708 45	9,720 10	14,000 00	1,000 00	5,279 90
Hampshire, Franklin, and Hampden,	600 00	-	56 00	2,451 60	3,107 60	1,021 25	571 40	2,492 35	3,063 75	8,513 35	14,000 00	300 00	5,786 65
Hampshire, . .	600 00	-	170 81	876 57	1,647 38	894 00	751 78	893 18	1,644 96	1,212 88	6,000 00	300 00	6,000 00
Highland, . . .	600 00	131 00	46 00	956 00	1,733 00	835 80	732 40	931 59	1,663 99	181 31	3,800 00	-	3,800 00
Hampden, . . .	600 00	-	20 00	2,470 65	3,090 65	1,731 25	666 50	2,300 53	2,967 03	24,000 00	60,000 00	123 62	36,000 00
Hampden East, .	600 00	-	57 00	508 61	1,165 61	1,298 00	865 15	286 36	1,258 48	50 00	5,000 00	-	5,000 00
Union, . . .	600 00	-	111 62	981 33	1,692 95	1,079 60	709 75	616 35	1,326 10	700 00	4,600 00	1,066 85	4,966 85
Franklin, . . .	600 00	120 00	382 50	12,226 98	13,329 48	1,854 00	1,673 75	10,969 52	12,643 27	1,400 00	10,000 00	1,500 00	10,100 00
Deerfield Valley, .	600 00	-	158 12	877 20	1,635 32	889 00	640 35	994 97	1,635 32	2,651 63	8,070 00	100 00	5,518 37
Berkshire, . . .	600 00	471 37	186 00	2,154 08	3,411 45	2,769 00	2,635 00	1,348 69	3,484 22	1,800 00	10,000 00	500 00	8,700 00
Hoosac Valley, . .	600 00	-	214 00	2,564 04	3,378 04	1,879 50	*1,455 75	4,307 86	4,400 36	7,138 67	12,500 00	586 99	5,948 32

Housatonic, . .	$600 00	–	$226 00	$3,786 28	$4,612 28	$2,847 50	$2,630 50	$2,021 48	$5,216 00	–	$3,000 00	$400 00	$3,000 00
Norfolk, . . .	600 00	–	166 00	2,424 46	3,190 46	3,861 00	1,620 50	1,514 58	3,135 08	$35,000 00	30,000 00	300 00	–
Hingham, . . .	600 00	–	138 65	2,180 38	2,919 03	1,243 50	860 69	1,059 80	2,702 33	5,000 00	34,600 00	4,600 00	29,600 00
Bristol, . . .	600 00	–	121 00	7,784 53	8,505 53	5,089 75	3,682 00	2,311 40	5,993 40	12,500 00	60,000 00	400 00	47,500 00
Bristol Central, . .	600 00	–	6 00	2,648 57	3,254 57	2,472 00	469 00	1,803 00	–	19,537 00	30,000 00	500 00	10,963 00
Plymouth, . . .	600 00	$137 50	182 50	5,212 63	6,132 63	3,836 00	2,744 27	2,128 13	6,065 36	11,253 23	40,000 00	2,000 00	30,746 77
Marshfield, . .	600 00	–	270 85	2,687 61	3,557 46	1,428 75	915 20	1,752 97	3,321 67	4,714 21	11,806 92	1,392 78	8,485 49
Barnstable, . .	600 00	–	84 00	984 73	1,668 73	736 95	736 95	777 50	1,514 45	1,650 00	6,000 00	200 00	4,950 00
Nantucket, . .	528 35	24 00	42 75	674 50	1,269 60	1,029 00	573 60	511 27	1,084 87	–	2,800 00	298 96	3,068 96
Martha's Vineyard, .	600 00	164 86	7 70	429 26	1,201 82	684 35	683 65	385 25	1,068 90	300 00	3,000 00	2,200 00	4,900 00
Totals, . .	$17,928 35	$10,419 70	$4,041 10	$81,585 74	$105,059 98	$57,683 70	$37,480 35	$60,729 38	$92,101 82	$211,329 25	$594,176 92	$119,014 69	$467,573 71

* For trotting not included.

PERMANENT FUND—HOW INVESTED.

Massachusetts.—In bank and railroad stock, railroad and mortgage bonds, etc.
Essex.—In farm, bank stock, railroad bonds, gas company stock, etc.
Middlesex.—In real estate.
Middlesex South.—In lands and buildings occupied by the Society.
Middlesex North.—In lands and buildings.
Worcester.—In real estate.
Worcester West.—In real estate and personal property.
Worcester North.—In real estate and buildings occupied by the Society.
Worcester North-West.—In the fair grounds and buildings.
Worcester South.—In exhibition grounds and buildings.
Worcester South-East.—In real estate and personal property.
Hampshire, Franklin, and Hampden.—In real estate.
Hampshire.—In exhibition grounds and buildings.
Highland.—In real estate.
Hampden.—In real estate.
Hampden East.—In exhibition grounds and buildings.
Union.—In exhibition grounds and buildings.
Franklin.—In grounds and buildings, bank stock, and fixtures.
Deerfield Valley.—In real estate.
Berkshire.—In real estate.
Hoosac Valley.—In real estate.
Housatonic.—In exhibition grounds and buildings and fixtures.
Norfolk.—In real estate occupied by the Society.
Hingham.—In hall and grounds.
Bristol.—In real estate.
Bristol Central.—In real estate.
Plymouth.—In real estate, furniture, and fixtures.
Marshfield.—In exhibition grounds and buildings.
Barnstable.—In hall and grounds, and deposit in savings bank.
Nantucket.—In exhibition grounds and buildings.
Martha's Vineyard.—In hall and grounds and notes of members.

ANALYSIS OF PREMIUMS AND GRATUITIES AWARDED.

FARMS.

SOCIETIES.	For management of farms.	For experiments in draining.	For ploughing at exhibition.	For reclaiming swamp lands.	For experiments with manures.	For spading.	For hedges and ornamental trees.	For reclaiming old pastures.	For orchards of all kinds.	For cranberries.	For other farm improvements.	Total amount offered for farm improvements.	Total am't awarded for farm improvements.	Total amount paid for farm improvements.
Massachusetts,	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Essex,	$20 00	-	$149 00	$15 00	-	-	-	$15 00	-	-	-	$382 00	$199 00	-
Middlesex,	-	-	39 00	-	-	-	-	-	-	-	-	113 00	-	-
Middlesex North,	-	-	-	-	-	-	-	-	-	$10 00	-	53 00	10 00	$55 00
Middlesex South,	-	-	46 00	-	-	-	-	-	-	1 00	-	117 00	47 00	47 00
Worcester,	-	-	41 00	-	-	-	-	-	-	-	-	52 00	41 00	41 00
Worcester West,	-	-	61 60	-	-	-	-	-	-	-	-	112 00	65 60	61 60
Worcester North,	-	-	5 00	-	-	-	-	-	-	-	-	-	-	-
Worcester North-West,	-	-	8 00	-	-	-	-	-	-	-	-	12 00	8 00	8 00
Worcester South,	-	-	42 00	-	-	-	-	-	-	-	-	117 00	42 00	42 00
Worcester South-East,	-	-	88 00	-	-	-	-	-	$6 00	-	-	172 00	94 00	94 00
Hampshire, Franklin, and Hampden,	-	-	-	-	-	-	-	-	-	3 00	-	20 00	3 00	3 00
Hampshire,	-	-	-	-	-	-	-	-	-	1 50	-	1 50	1 50	1 50
Highland,	-	-	-	5 00	-	-	-	-	-	-	-	15 00	5 00	5 00

Hampden,	-	-	-	-	-	-	-	-	-	-	-	$328 00	-	-
Hampden East,	-	-	$33 00	-	-	-	-	-	-	$0 75	-	301 75	$33 75	$33 75
Union,	-	-	-	-	-	-	-	-	-	-	$4 50	18 00	4 50	4 50
Franklin,	-	-	-	$6 00	-	-	-	-	$3 00	-	-	44 00	9 00	9 00
Deerfield Valley,	-	$5 00	-	-	-	-	-	-	-	-	-	35 00	-	5 00
Berkshire,	$50 00	-	40 00	-	-	-	-	-	42 00	-	-	158 00	132 00	132 00
Hoosac Valley,	20 00	-	-	-	$12 00	-	-	-	12 00	-	-	73 00	44 00	-
Housatonic,	30 00	-	-	-	-	-	$100 00	-	32 00	-	-	178 00	162 00	162 00
Norfolk,	-	-	80 00	-	-	-	-	-	-	3 00	-	319 00	83 00	97 00
Hingham,	-	-	18 00	-	-	-	-	-	-	-	-	18 00	18 00	18 00
Bristol,	-	-	190 00	20 00	-	-	-	-	-	-	-	60 00	20 00	20 00
Bristol Central,	-	-	58 00	-	-	-	-	-	-	-	-	-	-	-
Plymouth,	-	-	72 00	-	-	-	-	-	-	-	-	339 00	72 00	72 00
Marshfield,	-	-	39 00	-	-	-	-	-	-	9 50	6 00	144 00	54 50	54 50
Barnstable,	-	-	22 00	-	-	-	-	-	5 00	5 00	-	124 00	32 00	32 00
Nantucket,	-	-	26 00	-	-	-	-	-	-	-	-	115 00	26 00	26 00
Martha's Vineyard,	-	-	-	-	-	-	-	-	5 00	3 00	-	46 00	8 00	8 00
Totals,	$120 00	$5 00	$1,057 60	$46 00	$12 00	-	$100 00	$15 00	$105 00	$36 75	$10 50	$3,467 25	$1,214 85	$1,031 85

Analysis of Premiums and Gratuities Awarded—Continued.

FARM STOCK.

SOCIETIES.	For Bulls.	For Milch Cows.	For Heifers.	For Calves.	For Working Oxen.	For Steers.	For Fat Cattle.	For Horses.	For Sheep.	For Swine.	For Poultry.	All other Stock.	Total amount offered for Live-Stock.	Total am't awarded for Live-Stock.	Total amount paid out for Live-Stock.
Massachusetts, . .	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$1,999 07
Essex, ...	$76 00	$94 00	$107 00	-	$47 00	$8 00	$12 00	$301 00	$28 00	$68 00	$71 00	-	$1,087 00	$812 00	782 00
Middlesex, ...	31 00	84 00	64 00	$14 00	14 00	-	-	175 00	-	51 00	31 50	40 00*	859 50	504 50	351 00
Middlesex North, .	10 00	56 00	33 00	-	47 00	16 00	18 00	256 50	-	23 00	74 00	-	806 00	467 00	362 87
Middlesex South, . .	26 00	58 24	24 00	45 00	24 00	15 00†	25 00	152 00	19 00	54 00	66 00	10 00†	590 00	518 00	440 00
Worcester, ...	51 00	59 50	80 00	5 00	90 50	29 00	12 00	108 50	6 50	21 00	10 00	-	758 00	547 00	381 50
Worcester West, . .	91 32	96 50	36 60	22 00	56 40	68 80	60 44	289 00	25 96	39 12	33 50	50 00	1,526 00	1,449 64	1,443 14
Worcester North, .	19 00	22 50	23 50	8 00	8 00	-	6 50	79 00	-	19 00	25 00	-	334 50	334 50	334 50
Worcester North-West,	31 00	35 00	32 00	22 00	12 00	17 00	36 00	168 00	20 00	35 00	21 00	*70 00‡	663 00	499 00	466 00
Worcester South, .	36 00	31 00	33 00	21 00	35 00	39 00	28 00	583 00	21 00	28 00	17 25	-	1,083 50	872 25	872 25
Worcester South-East,	19 00	68 00	13 00	11 00	104 00	52 00	8 00	97 00	14 00	27 00	21 00	-	611 50	434 00	392 00
Hampshire, Franklin, and Hampden, .	44 00	40 00	54 00	-	14 00	7 00	14 00	119 50	34 00	23 00	54 75	104 00	726 00	508 25	441 50
Hampshire, . . .	18 00	30 00	6 00	12 00	46 00	17 00	14 00	122 00	32 00	30 00	34 50	20 00	474 00	381 50	381 50
Highland, . . .	38 00	37 00	22 00	5 75	43 00	25 50	15 00	142 00	55 00	6 00	5 50	51 00	504 25	445 75	445 75

Hampden,	$47 00	$93 00	$73 00	$36 00	$34 00	$29 00	$11 00	$157 00	$17 00	$22 00	$61 00	$46 00*	$976 00	$626 00	$548 50
Hampden East,	65 00	27 00	35 00	6 00	40 00	36 00	30 00	328 00	29 00	44 00	22 00	72 00	832 00	734 00	691 00
Union,	28 00	42 00	29 25	17 25	45 00	22 00	16 00	221 00	17 00	16 50	12 50	97 00	790 00	565 50	558 00
Franklin,	16 00	80 00	24 00	9 00	52 00	30 00	11 00	948 00	142 00	28 00	50 00	115 00	1,505 00	1,339 25	1,339 25
Deerfield Valley,	16 00	9 00	23 00	17 00	52 00	24 00	–	131 00	70 00	20 00	15 41	56 00	500 00	433 40	433 40
Berkshire,	106 00	159 00	77 00	18 00	40 00	21 00	29 00	573 75	134 00	46 00	60 00	44 00*	1,416 00	1,307 75	1,307 75
Hoosac Valley,	18 00	36 00	18 00	9 00	23 00	5 00	9 00	183 00	174 00	16 00	75 00	12 00*	776 00	578 00	578 00
Housatonic,	56 00	116 00	42 00	25 00	73 00	43 00	25 00	227 00	110 00	31 00	55 00	28 00	933 00	831 00	831 00
Norfolk,	40 00	28 00	23 00	–	–	–	–	156 00	–	78 00	106 25	–	1,171 00	431 25	334 50
Hingham,	61 00	68 50	28 00	–	16 00	6 00	18 00	53 00	24 50	59 00	41 40	41 00	442 50	416 40	416 40
Bristol,	94 00	142 00	58 00	28 00	112 00	54 00	98 00	222 00	23 00	64 00	162 00	232 75	1,289 75	1,289 75	1,253 75
Bristol Central,	105 00	79 00	99 00	–	64 00	–	42 00	219 00	27 00	51 00	224 50	42 00*	–	–	–
Plymouth,	56 00	96 00	64 16	43 76	66 84	56 56	73 36	204 00	56 60	67 00	90 00	33 00	1,252 00	907 28	907 28
Marshfield,	23 00	51 00	42 00	20 00	27 50	6 00	20 00	81 50	16 00	30 00	50 00	–	553 50	367 00	367 00
Barnstable,	22 00	11 00	30 00	12 00	15 00	15 00	26 00	46 00	17 00	37 00	39 00	–	318 00	270 00	270 00
Nantucket,	35 00	56 50	41 00	6 50	12 00	11 00	–	36 00	19 00	20 00	24 00	1 00	548 00	262 00	262 00
Martha's Vineyard,	–	25 00	16 75	8 50	18 50	7 00	20 00	58 00	44 00	2 00	55 90	30 85	430 00	278 50	278 50
Totals,	$1,278 32	$1,847 49	$1,250 26	$421 76	$1,231 74	$659 86	$677 30	$6,456 75	$1,175 56	$1,055 62	$1,619 01	$1,185 60	$23,756 00	$18,413 77	$19,469 11

* Herds. † Dutch stock. ‡ Town teams.

ANALYSIS OF PREMIUMS AND GRATUITIES AWARDED—Continued.

FARM PRODUCTS.

SOCIETIES.	Indian Corn.	Wheat.	Rye.	Barley.	Oats.	Beans.	Grass Crops.	Grass-seeds.	Potatoes.	Carrots.	Beets.	Parsnips.	English Turnips.	Ruta-bagas.	Onions.	Collections of Vegetables.	Pumpkins and Squashes.
Massachusetts, . .	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Essex, ...	-	-	-	-	-	-	-	-	-	$10 00*	$10 00	-	$10 00	$10 00	$10 00	$145 00	$10 00
Middlesex, . . .	$3 00	-	$3 00	-	$2 00	-	-	-	$10 00	10 00	8 00	$5 00	6 00	11 00	9 00	35 00	-
Middlesex North, . .	4 00	$1 00	5 00	-	2 00	$5 00	-	-	8 00	3 00	3 00	3 00	3 00	2 00	3 00	28 00	6 00
Middlesex South, . .	36 50	-	2 00	-	-	1 50	-	$3 00†	7 00	1 50	2 00	50	1 50	-	2 50	13 00	26 75
Worcester, . . .	1 50	-	2 00	$0 50	1 00	50	-	-	2 50	50	50	50	50	50	50	3 00	-
Worcester West, . .	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13 50	-
Worcester North, . .	2 25	-	-	-	-	-	-	-	75	-	-	-	-	-	50	6 00	-
Worcester North-West,	1 00	6 00	3 00	3 00	2 00	3 00	-	3 00	-	-	1 00	-	-	-	1 00	3 00	-
Worcester South, . .	24 00	-	6 00	-	10 00	-	-	-	24 00	-	-	-	-	-	-	22 00	-
Worcester South-East, .	1 50	-	-	-	-	-	-	-	1 50	4 00	4 00	-	-	4 00	-	23 00	-
Hampshire, Franklin, and Hampden, .	1 00	1 00	1 00	1 00	-	1 00	-	-	1 00	-	-	-	-	-	-	15 00	-
Hampshire, . . .	6 00	5 00	-	-	-	-	$3 00	-	5 00	1 50	1 50	1 00	1 50	1 50	3 00	10 00	-
Highland, . . .	20 00	5 00	-	5 00	6 00	-	5 00	-	9 00	6 00	6 00	-	2 00	5 00	-	9 00	-

Hampden,	$3 50	-	-	-	-	$0 25	$2 00	-	$5 50	$0 50	$0 50	$0 25	$0 75	-	-	$10 00	-
Hampden East,	8 75	-	$7 25	-	$0 75	2 50	-	-	6 75	6 75	6 75	75	75	$0 50	$1 50	18 00	-
Union,	6 00	-	-	$5 50	4 50	-	7 00	-	6 00	-	2 50	-	2 50	4 50	4 50	11 35	-
Franklin,	11 50	-	50	-	-	-	-	-	10 50	-	-	-	5 00	-	-	15 50	-
Deerfield Valley,	5 00	$5 00	-	-	-	-	-	-	3 00	3 00	-	-	6 00	-	2 50	6 00	-
Berkshire,	79 00	15 00	48 00	25 00	48 00	9 00	14 00	$47 00	50 00	9 00	12 00	14 00*	7 00	20 00	20 00‡	60 00	-
Hoosac Valley,	28 00	5 00	15 00	15 00	21 00	6 00	40 00	38 25	28 00	6 00	6 00	-	6 00	-	6 00	56 00	-
Housatonic,	89 00	18 00	63 00	14 00	60 00	12 00	39 00	6 00	29 00	6 00	15 00	-	7 00	9 00	2 00	20 00	-
Norfolk,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	102 00	-
Hingham,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26 85	-
Bristol,	43 00	-	10 00	-	-	6 00	25 00	-	15 00	-	15 00	-	-	14 00	-	122 00	-
Bristol Central,	50	-	1 50	-	-	3 00	-	-	2 00	-	1 50	-	-	-	1 50	38 50	-
Plymouth,	80 00	-	24 00	12 00	12 00	10 00	-	3 00	12 00	8 00	12 00	-	12 00	12 00	8 00	54 75	-
Marshfield,	42 00	1 00	7 00	-	50	1 25	7 00	2 00	3 75	1 00	1 25	50	-	50	1 50	52 00	-
Barnstable,	-	-	-	-	-	-	-	-	9 00	-	-	-	-	-	-	38 75	-
Nantucket,	18 00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	39 75	-
Martha's Vineyard,	20 00	-	11 00	-	3 00	-	13 00	-	10 00	4 00	3 00	-	-	-	4 00	39 80	-
Totals,	$535 00	$62 00	$207 25	$81 00	$172 75	$61 00	$155 00	$102 25	$259 25	$80 75	$111 50	$25 50	$71 50	$94 50	$81 00	$1,036 75	$42 75

* Cabbages.

† Buckwheat.

‡ Vegetable-gardens.

Analysis of Premiums and Gratuities Awarded—Continued.

FARM PRODUCTS—Concluded.

SOCIETIES.	Total amount offered for Grain and Root Crops.	Total am't awarded for Grain and Root Crops.	Total amount paid for Grain and Root Crops.	For Fruits.	For Flowers.	Any other Crops.	Butter.	Cheese.	Preserved Fruits and Vegetables.	Wheat Bread.	Rye and Indian Bread.	Corn Bread.	Honey.	Total amount paid out under head of Farm Products.
Massachusetts,	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Essex,	$265 00	$205 00	$188 00	$348 00	$62 00	-	$28 00	-	$20 00	-	-	-	-	$732 00
Middlesex,	164 00	92 00	84 00	179 00	96 00	$80 50	18 00	-	11 00	$22 00	$8 00	-	-	374 50
Middlesex North,	141 00	100 00	135 00	180 00	75 00	-	16 00	-	24 00	10 00	-	$4 00	-	336 50
Middlesex South,	257 25	112 75	102 75	75 00	10 00	18 50	18 00	-	19 00	15 50	5 00	-	-	243 25
Worcester,	21 25	21 25	1 50	30 00	-	-	9 50	$8 50	-	2 25	2 00	-	-	40 75
Worcester West,	52 00	-	-	59 25	16 00	6 00	13 00	24 00	-	6 00	6 00	-	-	195 75
Worcester North,	50 00	-	-	65 00	23 00	-	16 00	-	3 25	3 50	2 75	-	-	173 00
Worcester North-West,	40 00	29 00	24 33	16 00	10 00	5 00	9 00	11 00	-	6 00	3 00	-	-	76 65
Worcester South,	108 00	86 00	86 00	28 00	11 25	-	9 00	9 00	-	16 00	6 00	-	-	165 25
Worcester South-East,	143 00	38 00	36 50	29 25	7 75	11 75	13 00	-	3 75	3 00	1 25	-	-	85 50
Hampshire, Franklin, and Hampden,	27 00	25 00	22 00	62 25	10 50	-	10 00	-	7 50	3 25	2 00	1 50	-	95 25
Hampshire,	42 50	39 00	39 00	47 50	27 50	10 50	10 00	7 00	9 75	6 50	5 50	-	-	163 25
Highland,	104 50	81 00	81 00	18 00	4 00	6 00	10 00	3 50	3 00	1 20	1 80	3 20	$1 50	49 20

Hampden,	$57 50	$32 00	$25 75	$29 50	–	–	$13 00	–	$1 75	$2 00	$1 50	$1 50	–	$64 13
Hampden East,	127 25	70 75	67 75	32 00	$16 75	–	9 00	$9 00	4 00	3 00	3 50	3 00*	–	148 10
Union,	107 55	54 35	54 35	9 30	6 75	$8 00	11 75	7 00	3 25	2 55	3 40	1 40	–	107 75
Franklin,	57 50	43 00	42 00	72 50	36 50	–	21 00	21 00	6 00	3 00	3 00	3 00	–	198 50
Deerfield Valley,	90 00	44 50	44 50	33 25	7 75	–	7 00	3 25	8 65	5 00	4 00	4 00	–	130 65
Berkshire,	502 00	477 00	477 00	59 00	29 00	–	27 00	38 00	35 00	25 00	13 00	–	–	703 00
Hoosac Valley,	213 00	180 25	180 25	62 00	35 00	6 00	38 00	47 00	30 50	10 00	6 00	3 50	–	514 25
Housatonic,	399 00	389 00	389 00	117 00	35 00	61 00	45 00	35 00	6 00	23 00	18 00	–	–	729 00
Norfolk,	240 00	102 00	58 00	187 50	38 00	–	11 00	5 00	8 00	5 00	5 00	5 00	$5 00†	319 00
Hingham,	128 50	26 85	26 85	84 95	30 95	10 90	14 00	10 00	8 50	7 50	3 00	–	–	325 15
Bristol,	530 00	225 00	210 00	132 50	49 75	–	43 00	21 00	4 00	14 25	6 25	–	–	480 75
Bristol Central,	–	–	–	73 75	30 00	–	23 00	2 00	8 25	1 00	1 00	–	13 25	–
Plymouth,	414 00	259 75	259 75	106 00	92 00	16 00	29 00	29 00	25 00	15 00	15 00	–	–	586 75
Marshfield,	248 00	121 25	121 25	56 00	29 50	–	16 00	15 00	27 50	7 25	5 00	–	–	277 50
Barnstable,	197 00	47 75	47 75	75 30	37 50	7 75	12 00	–	12 50	6 00	6 00	6 00	–	210 80
Nantucket,	143 00	18 00	18 00	52 50	23 00	–	11 00	–	–	2 00	–	–	–	146 25
Martha's Vineyard,	186 00	107 80	107 80	51 40	6 25	–	9 75	2 00	–	28 85	4 50	3 00	–	213 65
Totals,	$5,055 80	$3,027 25	$2,930 08	$2,371 70	$856 70	$247 90	$520 00	$307 25	$290 15	$255 60	$144 45	$39 10	$19 75	$8,286 08

* Rye bread.

† Wheat and Indian bread.

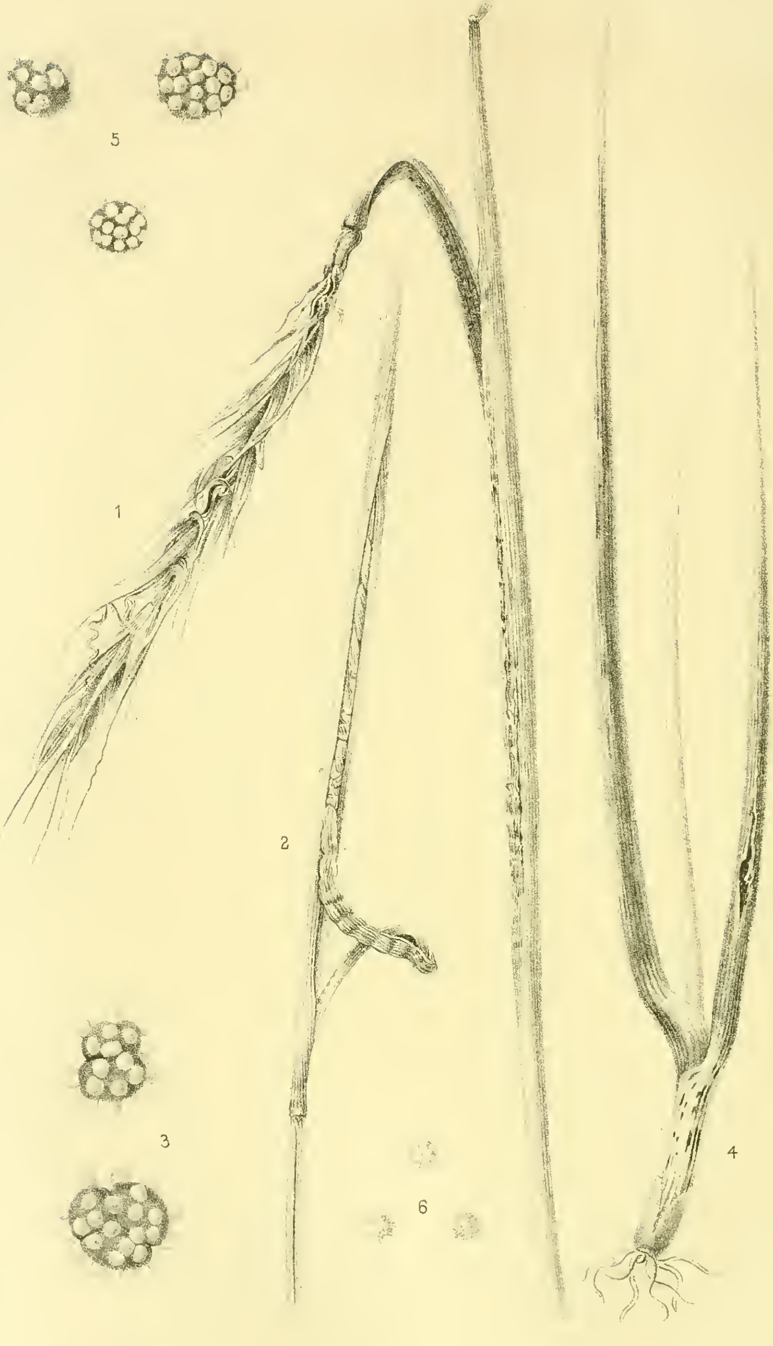
ANALYSIS OF PREMIUMS AND GRATUITIES—Concluded.

MISCELLANEOUS.

SOCIETIES.	For Agricultural Implements.	Offered for raising forest-trees.	For experiments on manures.	Amount awarded for objects strictly agricultural not already specified.	Amount awarded and paid out for Trotting-horses.	For objects not strictly agricultural; domestic manufactures, etc.	No. of persons who received premiums and gratuities.
Massachusetts, . .	–	$3,000 00*	–	–	–	$750 00	–
Essex, ...	$33 00	30 00	$25 00	–	–	251 75	375
Middlesex, . . .	26 50	50 00	–	–	$475 00	104 50	156
Middlesex North, . .	18 00	–	–	$4 00	–	–	321
Middlesex South, . .	25 00	60 00	–	–	450 00	82 75	174
Worcester, . . .	23 00	11 00	–	–	425 00	18 80	180
Worcester West, . .	20 00	30 00	10 00	–	580 00	84 00	228
Worcester North, . .	–	25 00	–	–	140 00	–	180
Worcester North-West,	14 25	30 00	–	–	643 00	118 75	239
Worcester South, . .	25 00	35 00	–	–	440 00	22 00	174
Worcester South-East,	3 00	30 00	–	–	550 00	87 50	330
Hampshire, Franklin, and Hampden, .	20 25	10 00	–	–	618 00	50 75	156
Hampshire, . . .	14 00	16 00	–	–	270 00	191 53	246
Highland, . . .	3 50	–	–	–	57 00	90 95	232
Hampden, . . .	34 00	30 00	–	–	50 00	–	69
Hampden East, . .	12 50	25 00	86 00	–	200 00	52 75	96
Union, ...	6 25	–	–	7 00	103 00	48 25	202
Franklin, . . .	–	10 00	5 00	–	795 00	83 00	256
Deerfield Valley, . .	5 00	–	–	–	–	76 29	262
Berkshire, . . .	31 00	–	–	–	318 75	492 00	575
Hoosac Valley, . .	19 00	–	14 00	24 00	905 00	276 50	327
Housatonic, . . .	28 00	–	–	30 00	465 00	385 50	708
Norfolk, . . .	–	40 00	–	–	870 00	–	185
Hingham, . . .	6 00	–	–	3 95	–	217 00	284
Bristol, ...	22 00	30 00	60 00	94 00	1,448 00	359 75	725
Bristol Central, . .	–	–	–	–	656 00	223 65	294
Plymouth, . . .	10 00	60 00	–	23 00	954 00	191 24	532
Marshfield, . . .	5 00	50 00	–	18 00	–	193 20	636
Barnstable, . . .	5 00	7 00	–	10 00	50 00	159 15	350
Nantucket, . . .	–	23 00	16 00	–	–	101 35	179
Martha's Vineyard, .	6 00†	11 00	–	–	20 00	180 20	416
Totals, . . .	$415 25	$3,613 00	$216 00	$213 95	$11,482 75	$4,893 11	9,057

* For the planting of trees on not less than five acres, to be paid in 1887.

† Awarded and paid out for raising trees.



J H Blake, Des.

FIG 1–3 RYE SMUT.
„ 4–5 ONION SMUT.
„ 6 SPORES OF CORN SMUT.

SEE P 168

ABSTRACT OF RETURNS

OF THE

AGRICULTURAL SOCIETIES

OF

MASSACHUSETTS.

1876.

EDITED BY
CHARLES L. FLINT,
SECRETARY OF THE STATE BOARD OF AGRICULTURE.

BOSTON:
ALBERT J. WRIGHT, STATE PRINTER,
79 Milk Street (corner of Federal).
1877.

PREFACE.

My thanks are due to EDWARD A. SAMUELS, Esq., for the beautiful chromo-lithograph of his Plymouth Rock fowls. This breed is essentially American in its origin, and it is rapidly growing in popularity, promising at no distant date to become the favorite breed for general utility for the farmer. Among the essentials requisite in a good and profitable breed of poultry in this country are the following:—

Hardiness; early maturity, and the development of a large and full breast, thus affording an abundance of "white meat" as a table fowl; good laying qualities, and good setting and motherly instincts in the female bird.

In respect to hardiness, the "Plymouth Rocks" are almost unequalled; they are early fledgers, the chicks being full feathered when Brahma chicks hatched in the same brood are running about almost naked. This trait in the "Plymouth Rocks" places them among the most desirable breeds for early hatchings.

The greatest profit in poultry-raising comes from the birds that are large and heavy enough for "broilers" by the middle of June; early hatched chickens of the ordinary kinds receive many checks and pull-backs from exposure to inclement weather and cold storms; breeds having a large infusion of Asiatic blood are especially liable to these mishaps, because of their callowness, their nakedness between the down and feather periods. I have known of many instances of whole broods of well-grown Brahma chickens receiving chills in many storms, and dying, when, had they had a coating of feathers heavy enough to repel the rain and cold, they would have suffered no serious mishap.

The "Plymouth Rock" chick feathers at a very early stage of its existence, and while its more tender and less lucky neighbors are suffering from cold and dampness, it runs about in severe weather bright and active, and suffers nothing from a cold, late spring.

The matured "Plymouth Rock" fowl is unequalled for hardiness; it is thickly feathered, closely built, very full bodied, and is altogether a model New England fowl.

As regards early maturity, I think it is generally admitted that no breed of fowls can put on as much meat when young, in a given time, as the "Plymouth Rocks." It is astonishing to see what full-bodied, heavy birds they are, and when they are compared with the scrawny, lank Asiatics of their own age, they appear to the very best advantage; they are, perhaps, not quite so large, but they are astonishingly compact and solid.

The laying qualities of this breed, I believe, are not so marked as those of the Leghorn and some few other non-setters. Probably, taking the year through, the "Plymouth Rock" fowl will lay more eggs than any of the so-called Asiatic breeds. The eggs are not quite as large, but are better flavored.

I am indebted, also, to Charles O. Ellms, Esq., of Scituate, for the admirable cut of his pure-bred Jersey cow, "Jersey Belle," No. 2463, A. J. H. B. Her sire was "Victor" (1256); dam, "Jennie" (2462), by "Victor" (1256); grandam, "Fannie" (2460), imported. "Victor" (1256) was sired by "Pilot" (163); dam, "Minnie" (2461), by "Dick Swiveller"; grandam (imported), cow "Duchess." "Jersey Belle" is five years old. Mr. Ellms says she made, in March, 19½ pounds of butter per week; in June, 16 pounds; in September, 14 pounds per week, and in December, ten months from calving, she was making one pound per day, and due to calve in two months. Five quarts of milk made a pound of butter all through the summer, and in December, four quarts made a pound of butter. Her feed in summer, common pasture, kept in the barn over night, and had two quarts of shorts; in the winter, she was fed on rowen hay and two quarts of shorts per day. It is a very remarkable yield.

My thanks are due, also, to the Massachusetts Society for Promoting Agriculture for the admirable plate illustrating the valuable essay on onion-smut.

The laws relating to the State Board and to the agricultural societies will be found in the Appendix, where they will be convenient for reference.

CHARLES L. FLINT.

OFFICERS OF THE AGRICULTURAL SOCIETIES—1877.

MASSACHUSETTS.

President—THOMAS MOTLEY, of West Roxbury.
Secretary—EDWARD N. PERKINS, of Boston.

ESSEX.

President—BENJAMIN P. WARE, of Marblehead.
Secretary—CHARLES P. PRESTON, of Danvers.

MIDDLESEX.

President—JOHN CUMMINGS, of Woburn.
Secretary—RICHARD F. BARRETT, of Concord.

MIDDLESEX SOUTH.

President—DAVID NEVINS, Jr., of Framingham.
Secretary—ABEL F. STEVENS, of Natick.

MIDDLESEX NORTH.

President—JOHN A. GOODWIN, of Lowell.
Secretary—E. T. ROWELL, of Lowell.

WORCESTER.

President—CHAS. B. PRATT, of Worcester.
Secretary—GEORGE H. EASTABROOK, of Worcester.

WORCESTER WEST.

President—GINERY TWICHELL, of Brookline.
Secretary—HENRY J. SHATTUCK, of Barre.

WORCESTER NORTH.

President—JOHN B. PROCTOR, of Fitchburg.
Secretary—EDWARD B. SAWTELL, of Fitchburg.

WORCESTER NORTH-WEST.

President—JEROME JONES, of Boston.
Secretary—E. T. LEWIS, of Athol.

WORCESTER SOUTH.

President—SAMUEL N. GLEASON, of Warren.
Secretary—A. C. MORSE, of Sturbridge.

WORCESTER SOUTH-EAST.

President—WILLIAM KNOWLTON, of Upton.
Secretary—CHAS. J. THOMPSON, of Milford.

HAMPSHIRE, FRANKLIN AND HAMPDEN.

President—J. H. DEMOND, of Northampton.
Secretary—L. C. FERRY, of Northampton.

HAMPSHIRE.

President—FLAVEL GAYLORD, of Amherst.
Secretary—EDWARD E. WEBSTER, of Amherst.

HIGHLAND.

President—CHARLES FAY, of Chester.
Secretary—JONATHAN McELWAIN, of Middlefield.

HAMPDEN.

President—WILLIAM PYNCHON, of Springfield.
Secretary—J. N. BAGG, of West Springfield.

HAMPDEN EAST.

President—HORACE P. WAKEFIELD, of Palmer.
Secretary—GEORGE ROBINSON, of Palmer.

UNION.

President—HENRY K. HERRICK, of Blandford.
Secretary—ENOS W. BOISE, of Blandford.

FRANKLIN.

President—D. ORLANDO FISK, of Shelburne.
Secretary—JOHN A. AIKEN, of Greenfield.

DEERFIELD VALLEY.

President—DAVID L. SMITH, of Coleraine.
Secretary—M. M. MANTON, of Charlemont.

BERKSHIRE.

President—THERON L. FOOTE, of Lee.
Secretary—WM. H MURRAY, of Pittsfield.

HOUSATONIC.

President—J. L. MILLER, of Sheffield.
Secretary—HENRY T. ROBBINS, of Great Barrington.

HOOSAC VALLEY.

President—O. A. ARCHER, of Blackinton.
Secretary—H. CLAY BLISS, of North Adams.

NORFOLK.

President—HENRY S. RUSSELL, of Milton.
Secretary—HENRY O. HILDRETH, of Dedham.

BRISTOL.

President—THEODORE DEAN, of Taunton.
Secretary—D. L. MITCHELL, of Taunton.

BRISTOL CENTRAL.

President—JOHN A. HAWES, of Fairhaven.
Secretary—CHARLES DURFEE, of Fall River.

PLYMOUTH.

President—B. W. HARRIS, of East Bridgewater.
Secretary—LAFAYETTE KEITH, of Bridgewater.

HINGHAM.

President—EDMUND HERSEY, of Hingham.
Secretary—WM. H. THOMAS, of Hingham.

MARSHFIELD.

President—GEORGE M. BAKER, of Marshfield.
Secretary—FRANCIS COLLAMORE, of Pembroke.

BARNSTABLE.

President—AUGUSTUS T. PERKINS, of Boston.
Secretary—T. B. GOSS, of Barnstable.

NANTUCKET.

President—RICHARD E. BURGESS, of Nantucket.
Secretary—WENDELL MACY, of Nantucket.

MARTHA'S VINEYARD.

President—J. N. LUCE, of Edgartown.
Secretary—B. T. HILLMAN, of Chilmark.

AGRICULTURAL EXHIBITIONS—1877.

Essex, at *Lawrence*,	September 25 and 26.
Middlesex, at *Concord*,	September 27, 28 and 29.
Middlesex North, at *Lowell*,	September 25 and 26.
Middlesex South, at *Framingham*,	September 18 and 19.
Worcester, at *Worcester*,	September 20 and 21.
Worcester West, at *Barre*,	September 27 and 28.
Worcester North, at *Fitchburg*,	September 25.
Worcester North-West, at *Athol*,	October 2 and 3.
Worcester South, at *Sturbridge*,	September 13 and 14.
Worcester South-East, at *Milford*,	September 25, 26 and 27.
Hampshire, Franklin and Hampden, at *Northampton*,	October 3, 4 and 5.
Hampshire, at *Amherst*,	September 18 and 19.
Highland, at *Middlefield*,	September 13 and 14.
Hampden, at *Springfield*,	September 25 and 26.
Hampden East, at *Palmer*,	September 18 and 19.
Union, at *Blandford*,	September 19, 20 and 21.
Franklin, at *Greenfield*,	September 27 and 28.
Deerfield Valley, at *Charlemont*,	September 13 and 14.
Berkshire, at *Pittsfield*,	October 2, 3 and 4.
Housatonic, at *Great Barrington*,	September 26, 27 and 28.
Hoosac Valley, at *North Adams*,	September 18 and 19.
Norfolk, at *Readville*,	September 27 and 28.
Bristol, at *Taunton*,	September 25, 26 and 27.
Bristol Central, at *Myrick's*,	September 12, 13 and 14.
Plymouth, at *Bridgewater*,	September 19, 20 and 21.
Hingham, at *Hingham*,	September 26 and 27.
Marshfield, at *Marshfield*,	October 3, 4 and 5.
Barnstable, at *Barnstable*,	September 18 and 19.
Nantucket, at *Nantucket*,	September 5 and 6.
Martha's Vineyard, at *West Tisbury*,	October 2 and 3.

AGRICULTURE OF MASSACHUSETTS.

THE RELATIONS OF AGRICULTURE TO CIVILIZATION.

From an Address before the Essex Agricultural Society.

BY CYRUS M. TRACY.

The civilization of to-day is no doubt better than any the world has seen before. To say that there is no better still beyond and to come, would be too much; yet no man knows of it save by conjecture. We have to do with that of to-day as the best yet devised, and that for the security and promotion of which we are all obligated and responsible. If we analyze it, it is a composite thing, multiplied in parts, and full of dependencies. To deal with it in every aspect is more than enough for the wisdom of every statesman, and the acumen of every teacher. Yet, like all stupendous existence, the more it is studied the better it is known; and it may be more useful to work awhile at a few of its most salient points, and try to understand them, than to do nothing, on one hand, or, on the other, seek to do the whole when we cannot. And thus, considering the relations of agriculture to the best civilization, let me say, at the outset, that it is *the nurse of its truest liberty*.

There may be in it something of imagination, but to me it always seems as if each craft of mankind bore upon its very face something of its spirit and social tendency. The artisan, even in his freest condition, acts and moves like a man employed under another, and too often, more than this, under the surveillance of his fellow-workmen also. The mere day-laborer—though with us the fact is denied—still wears the look that tells of submissive, unthinking muscle, and too nearly affiliates him with the beast he drives. The artist and man of imagination, with face half-spiritualized, shows yet in that face the deep uncertainties of his own living. And so of the rest. But he who stands upon his own acres bares his brow to heaven with another aspect. He stands nearer to a certainty. So far as human hands may hold it, the key of his life and welfare is in his own grasp, and he knows it. And thus he meets the world half-way; able, if need be, to retire to the fastness of his own economical home, and there defy the besiegers. They may sit before his walls while they will; but the rain and the sunshine are his, and the earth, despite of foes, shall give him always meat and drink in its season.

To prove the husbandman the original freeman might seem superfluous. The examples of the world and of history are almost too many. The freest people of Europe have perched themselves upon the Alps, where, though the cultivated crops are slender, the true agricultural spirit leads them, with free breath and step unfettered, to pasture their herds, and sing their *Ranz des Vaches* on the grassy slopes of Mount Rigi and the Matterhorn. And shall we not recognize the fact, that those time-honored stern barons of England, who gave such resistless *dicta* to King John that he ground the chips of the wayside between his teeth for rage when he dared not deny them,—shall we not recognize in them the landed agriculturists of that day, and the progenitors of those whose influence has since turned that land into a garden of fruitfulness, and her laws into institutions of liberty?

I anticipate here an objection. It has been repeatedly said, for years past, that our Southern States stood, as an agricultural community, opposed in nature to the manufacturing people of the North. Indeed, we well remember the boast of secession, that they *were* thus agricultural, and such a people could not be subjugated. Yet it was this same people who gave to the world the revolting spectacle of domestic slavery, and a great civil war waged for its defence.

But I see no incongruity. It is not fortunate for the body politic when any one industry grows to an inordinate or disproportionate bulk. The agriculture of the South was certainly in this position. There were not wholesome manufactures enough joined with it to make a stable combination, but it stood as a wall made wholly of mortar, an earthwork merely. And it were no wonder, if, on an agriculture thus overgrown and heedless of its natural associations, there were ingrafted the false branches of oppression, fictitious license, and unlawful ambition. Had it kept to its true relationship, as that of our own section had been allowed to do, we should not have seen it fostering slavery, discouraging manufactures, nor despising liberal arts and education, even as it more than despised a free government and the rights of the people. But I hasten forward. A sound agriculture appears as *the best friend of honest trade.*

The highest civilization among men can, probably, never overtop the necessity of commercial traffic. No speculations of Fourier, no Republic of Plato, or Utopia of Sir Thomas More, has yet been able to explain away the need of mercantile exchanges of some sort among the people, and if so, there is almost as great need that they should be honestly conducted. And here I will ask only your attention to the facts, since I have not time to enter upon the argument *a priori.* Said the great Webster, in one of his moments of triumph, "There is Massachusetts, look at her!" Adopting his thought, I say, "There is American Agriculture, look at *her!*" What is her position before the world to-day, in the time when dishonesty and brazen robbery have almost their own way, and more is written and printed upon financial criminality than was upon the breadth of the civil war a dozen years ago? What shall we say less than this, that the robbers and embezzlers, the rogues, burglars and defaulters, have *not been found among her followers!* We will not overpraise the farmer; but there is something about his calling that keeps him, apparently, out of, and aloof from, most of such criminalities as these. What it is, you can say as well as I; but certain it is, that this infection has broken out, specially, rather among the classes that cannot afford to wait for gain to grow by any natural seedtime and harvest, but thirsting, like Ortogrul of Basra, for that golden stream which is quick and violent, have broken away from the trammels of the even life of the husbandman, and thrown themselves into the vortex of speculation, high contract, and jobbery. A pure-spirited agriculture is too good a friend to honesty to satisfy such; they turn their backs on the farms of inner New England, and, pressing into the cities and greater towns, seek for that fevery meat that alone can answer the appetite of a Tweed or a Winslow. I say that the fact that husbandry owns almost none among such misdoers, is enough to raise more than a presumption that the field and the pasturage are not good soils in which to grow a first-class rascality. The motive to all this obliquity seems, mostly, to be a restless haste for premature wealth; but the atmosphere of the farm is, doubtless, always rather that of contentment. There is meanness enough, usury enough, hard bargaining enough, among the agriculture of our country; but it does not tempt the cupidity of man like the brokers' board or the stock office. The narrow-souled man may rot his apples rather than lower his price, or bargain his corn to the whiskey-maker for a slight advance over the hungry of the land,—these are bad enough,—but they are legitimate and fair beside the traffic in building-jobs, the clandestine trade in patents and pardons, the corners in fancy shares, and the flying of "kite-paper." And again I say, the art of the husbandman is blessedly removed from these by its nature, and its influence on him must always be in the direction of an honest trade, that seeks to render equivalent for equivalent, and thus only. But I hold that agriculture is related to civilization, as *the promoter of its education.*

I am not about to open again the debates that have distinguished Massachusetts for the last thirty years, nor to bring forward for fresh worship the idea that teaching is good only in proportion to its magnificence. I think no one will oppose me if I say that I recognize a true, real, natural education of youth, before, above and beyond all special systems yet enunciated. It is that education that seeks to develop the young man or woman symmetrically, to give broadening and deepening views of life, its method, and its needs. It is that which tells the boy that patient growth is earliest perfect, but that soon ripe is soon rotten. It is that which encourages him to be excellent in something, but not wholly ignorant in anything. It is that which shows him that he has a perfect right to be president, but lays its hand on his head, and prays God he never may wish to be. In a word, it is that which can instruct the child, and will, wherever it meets him,—whether in the school-room, palace, or the factory at noontime; whether in the woods by the sled, with the oxen chewing stalks in the snow, or at mother's knee by the fireside, where Doddridge learned the story of the cross, and West earned the loving kiss that "made him a painter."

Such, reduced to simple facts, is nearly the education that our own Essex has always encouraged. I will put this statement on trial for its verity, and any one may look up the evidence. We have not despised the college or the classics; yet, the young men who, from our midst, have entered on them, have carried thither more of sound and useful education than they added thereafterward. It was learned at home, by snatches, after supper, or in the little common school, a mile from the house in summer, but surely two when the snow was deep. It was learned because it was hungered for, and not because it was fashionable; because the boy verily thought that strength and wisdom were the noblest attributes of man, and to these he labored gloriously to aspire. Such motives have, for two hundred years, urged the youth of Essex forward toward learning, and the result—is it not written and laid up in the archives of the nation and the world? Yet, all this is not the way of merchants and manufacturers. It is hardly the method of the counting-room or the quarter-deck. But where you see the cows thick on the pastures, where you can count the corn-rows a mile off, in spring, for freedom of weeds, and the apples are heaped under the autumnal trees as if busy ants had piled them,—there are boys who demand, and find out, *why* they carry one for every ten, and girls that, being taught the revolution of the earth, would at least get an idea that it turned over. But a step beyond this shows agriculture as *the stimulus of science.*

The world is to-day proud of its science,—proud of what it has learned of the laws of nature. It is so proud and so pleased with its scales and measures of the inanimate world, that it aspires to place them on the pinions of life, the rainbow of the mind, and even the still small voice of Deity. I am not about to declaim at all against its follies, nor utter loud warning against its excesses; for that which is true shall alone endure, and that which it builds of stubble will surely come to naught. That the verities of science are a benefit to humanity, one must be weak, indeed, to deny; and of these, no one is better prepared to see the value in practice, than the tiller of the ground. For if it be the province of a true science to investigate and expound the laws of nature, surely the man who, of all, stands most near to her side, will be the best customer in that mart. He talks with botanists, for he needs to know more and more of the structure and style of vegetation. He consorts with geologists, for the rocks are the original of soils, and to know something of the material is to command a surer result. He can welcome the chemist at all times, for what part of his calling does not need his lessons? —and whoever can teach him of climate and the atmosphere, is a friend in need, whether for drought or storm.

We may say that some special lines of study fit better some other pursuit than this. The mariner has greater need of astronomy and the mathematics than the farmer; nor will the latter be urgent after the finer engineering, nor, perhaps, the profounder optical and electrical studies. But for science in general, and, especially, all that treats of organic and living existences, he is the man of strongest and most abiding appetite.

Let me be understood. Much has been said of "book-farming," and, if I mistake not as to its present popularity, the nays have it by a plain majority. Yet this term, applied as it usually is to a merely theoretical agriculture, has no connection with science as I speak of it. For agriculture, of all the arts in the world, is, and ever must be, thoroughly empirical. No rules for it can be stated beforehand that shall be general; no methods contrived that will work well always. The cultivator must experiment and try; compare and study results, and try again. He will not long believe with Liebig, that the ashes of a plant contain all things needed for its growth; nor with later chemists, that the analysis of a handful of soil would give a certain indication of the composition of the whole field. He sees, with the plain eye of common-sense, that, in such a pursuit, an infinity of causes must be concerned, and therefore the joint effect cannot be predicted, but must be always found by observation. And thus he is the man to encourage the study of all natural science, whether in the mutations of temperature, the probabilities of weather, the habits and movements of insects, the knowledge and agency of beasts and birds, the reactions of all chemical forces, and the growth of every green thing, from the hemlock to the herdsgrass. I might dwell here long; but I hasten to say that agriculture is *the encourager of art.*

Possibly I may here encounter a doubt; for one may ask if the painter, the poet, and the sculptor were not always more at home, and better welcomed in the city than the country, in the palace more than the homestead? This may be, and yet be more a statement of what has been, than of what might, or ought to be. For it is still true, that if the patronage of the artist be in the metropolis, his best inspirations are far oftener than otherwise drawn from nature unsubdued, or the gentleness of country life. And considering the insatiate and immortal character of that aspiration that makes the artist to be what he is, may we not reckon that as much for his encouragement that gives him food and material for thought, as that which buys his works at a price in the shambles? Yet even this is not all my argument. I look out on the innumerable scenes of the country and the farmstead, full of beauty and significant of all that is lovely, and I say, if the undevout astronomer is mad, what shall be said of the unartistic farmer? I know the yeoman is not blest with much leisure for the study of Raffaelle or Mendelssohn; he is not very familiar with the dialect of Tennyson, or of the sculptor's modelling-room; but he as well as any one—nay, better—can and does appreciate the sublime truth, that art is, rightly, only the visible expression of beauty, and that beauty is a high gift of God, which let no man despise.

It is the most cruel uncharity to assume that the heart of the husbandman is hard against the loveliness of art. I have been among such all my life, and know better. I heard a wealthy manufacturer say, that he had been in the famous gallery at Dresden, but whether he saw the Sistine Madonna, he was not sure, for it rained, and he was looking after his umbrella! I do not believe any farmer of Essex would have missed that picture, though some might have gaped a very little while they admired it. For who, of all our people, seize most greedily upon all such refinements, when available, if not these? Who likes best to improve his place, and make a graceful drive up from the highway to its door? Who will try to set his trees to the best advantage, and dispose his flower-beds well before the house, for the finest effect of the posies that grow there, and of the matrons and maidens that tend them? Who buys a good picture, when he can, and a handsome book often, and is even willing to dare to look on a premium chromo, rather than have nothing of the kind? Take your fine performers, and go among the farms of New England, with a choice entertainment. You will bring to your hall twenty cultivators for one of other callings, and their proportion to the whole population will be fifty per cent. greater than in any city you can visit. The man who has all these things crowded and piled along his daily path, gets indifferent to them; but the yeoman's appetite is always sharp, and, more than that, it is rarely unnatural.

After this outline of a proof that need not be further detailed or extended, I will leave it for your own judgment whether the natural influences of agricultural pursuits are not related to a high civilization in a way most favorable to the latter. Nor will I advance the question, almost impertinent here, whether such a civilization be not the most desirable of all things for human beings, dwelling together in anything called society. But a plain conclusion must follow. It may not happen, as matter per consequence, that the thoughts and habits of the yeomanry of the country will be fully up to the natural and theoretical demands of their pursuit. And therefore am I here to-day, not to deck your farms with rhetorical rainbows, nor flatter you with high commendation, but to show you that you have a duty, and that the circumstances of the age are making it more and more imperative.

The common trite expressions as to the antithesis of town and country, are not necessary to be here repeated. We are all well aware that the correcting, revising, recuperating force resides in the country, for the restraint of the hot and seething evils that breed so fast and foully in the cities. Nothing to-day holds the vicious multitudes of New York in check but the salutary thought and strong hand of the country behind it; and were that country more like New England in social character, there might be found resemblances between the two capitals where now there are only contrasts.

I speak for another reason. The next great period will no doubt witness large changes from the present social condition. For twenty years past, at least, the country and its pursuits have been constantly drawn upon, depleted, robbed of their natural reproduction by the factitious attractions held out by the denser communities, to induce the young to forsake the plough and hayfield, and join in the chase after wealth in an hour, and eminence in six lessons without a master. To such an extent has it gone that a smooth-faced boy, even, seeing in his folly no quicker method, resorts to train-wrecking, thinking in this bold way to force a large and sudden income without labor. But it seems as if the insane thirst that had driven men away from the sure and peaceful path, and made them cry, as did a distinguished politician of Maine, that he, "within four years, would be either in hell or in Congress," must soon experience a crisis. The land is, meanwhile, starving for labor; the sod gets thick on the old cornhills, and the fields that would give the tiller a safe and not too toilsome living, run to bushes, because he has gone to the city for more than a living and got considerably less than one. It is against this unnatural distribution of things that your efforts, O husbandmen of Essex! may well be directed. You are in part responsible for the leaning of this social tower, that threatens more its fall than does that of Pisa. The jobbing and managing crowds of State Street and Wall Street may boast of refined manners and elegant homes; I do not care: theirs is not a high, a noble, a beneficent civilization. They may display wealth and feed fat in luxury; but so could the courts of Pharamond and Charles II., and both were cursed with a corruption to which our own erratics even now seem tending. In your hands, I say again, is the medicine for such frenzies, if you stand for the interests of agriculture, and if you deserve the character I have drawn; and the nation shall hold you responsible if it is not applied. The elements of a high civilization are nowhere more developed or more in the hands of the agricultural class than in Essex: let us see you strike an early blow at the false life that usurps the true vitality of the people. Open the resources of your lands and the encouragements of your towns, and try to draw back within wholesome and unfevered influences those who, in delusion and mistake, are thronging the streets of our cities, and daily falling backward in all that belongs to a lofty social culture. Cry to them, as you can well afford to do, that when God made man to dress the soil, he proved his perfect and sufficient wisdom. If you have in time past showed discontent yourselves, and told your boys that farming was poor business, retrieve your error before they are far gone in business worse than any farming can be. Call to them that contentment dwells indeed in the homestead; and as the faithful spies said of the promised land, " Come up and possess it, for we are well able to overcome it." Then, when by your judicious efforts, you have drawn back to your side some of those who have wandered away, may we begin to breathe a clearer atmosphere, and feel that the simoom that is called enterprise and means madness, has passed us with its deadly heat. Then, if you have reasonable success, and others follow your example, when the great art of agriculture, first-made of the Almighty, has come more nearly to its true estimation among the people, may we hope for a pure and lofty civilization, for the prosperity of liberty, uprightness, education, science and art, and that good religion of God that surmounts and includes the whole!

ADVANTAGES OF NEW ENGLAND FARM-LIFE.

From an Address before the Franklin Agricultural Society.

BY L. F. MELLEN.

It is evident that a wise providence directed our Pilgrim Fathers, as tillers of the soil, to land on the rocky coasts of New England, selecting the then most unpromising part of the New World for their future homes, that by faithful industry, combined with moral principles, they might establish model homes that should thereafter be represented in their descendants. Had the Pilgrims landed upon the banks of the Mississippi, these hills would never have been dotted with churches, school-houses, and homes, and a race of men, partaking of the hardy character of New England, would never have been born to preserve the Republic and christianize the world. New England, with its variety and fertility of soil and healthfulness of its climate, gave the Pilgrims and their descendants an advantage which, in comparison with other sections of the United States, was important. These advantages, it can be fairly claimed, it still maintains.

In the report of the Massachusetts Board of Health for 1875, statements are made, that the value of its farm products is greater, both per farm and per acre, in this State, than any other in the Union, outside of New England. The nearness of the farm to the market is one reason given for this remarkable fact. This is not the only blessing, for the same report says, in regard to life and health, the farmers of Massachusetts live, on an average, about sixty-five years, which is nearly fourteen years beyond the average life. The luxury of farming, as compared with other professions, has often been pictured in too fanciful colors. Incident to every business pursuit, there are pleasures to enjoy, difficulties to be overcome, and hardships to be endured. The merchant talks of bad debts, constant confinement to his store, and sleepless nights. The mechanic will tell you there is no demand for his labor, on account of dull times. Men of salary fear another day will find them out of employment, and other professions tax mind and body to obtain a livelihood, and all complaining because they have none of the quiet and independence of farm-life. Of all occupations, farming seems to be the safest.

Does farming pay? That is a question that bothers many here in the Connecticut Valley. If we look at it in a money point of view exclusively, I suppose the majority of farmers will say it does not pay. Farmers may not always become rich, but most of them manage to obtain a living for themselves and their families, which is more than can be said of many other pursuits. There are successes and failures in every calling. It is a well-known fact, that ninety out of every hundred merchants fail during their business life. It was a rare thing for farmers to become bankrupt, in this section, until within the last two or three years. No business occupation or employment is so sure to be remunerative as farming, if the necessary conditions of success are complied with. And I venture the statement that farming offers more attractions than any other pursuit to laboring men of moderate means, provided, always, that they have the necessary knowledge of the business. A small capital will secure the possession and permanent control of a farm, without financial danger or loss, while trade and manufacturing require large investments, with large risks.

In a moral point of view, the life of the agriculturist is the purest of any class of men. Man seems to have a natural love for mother earth, and the young man who goes to the city to live, or accepts any other vocation or profession, looks back with longing eyes to the old homestead in some rural spot in the country, and, as he turns back to visit it,—it may be after many years,—what memories crowd upon him, in his anticipation of seeing his old home once more!

"Ah! here it is, that dear old place,
Unchanged through all these years;
How like some old, familiar face
My childhood's home appears.
The grand old trees, beside the door,
Still spread their branches wide;
The river wanders, as of yore,
With sweetly murmuring tide;
The distant hills look green and gay,
The flowers are blooming wild,
And everything looks glad to-day
As when I was a child."

Home is the largest part of this earth, if we choose to make it so. The French have no such word as "home" in their language, and certainly have not, as I can testify by observation, in their experience and habits of life.

The ownership of a home is something of which neither the Irish peasant nor the German laborer has any conception. The desire to own the roof under which one sleeps is distinctly an American characteristic, and seems, by nature, adapted to the growth which is raising us, as a nation, to importance in the scale of nations. Our American homes can be made still more attractive. The truest and pleasantest homes are often houses not especially "well kept," as some would term it, but where the comfort and happiness of the inmates are best secured. The pleasantest room in the house should be used as the *living-room*, with free access to all the members of the family. Some housewives think that certain things and apartments are too good for daily use; hence, furniture is covered; the parlor is closed, except for company and special occasions, and there is a kind of sacredness about that dark and musty room, which, when entered by the children, they feel as if they were treading on holy ground. If the blinds are opened, the carpet may fade; if the windows are opened for fresh air, a fly may appear. Lavish expenditure in decorating the house with costly furniture,—too good to be in constant use,—is not, necessarily, evidence of taste, refinement, intelligence or happiness. It is the duty of the farmer to study his home, as well as the soil and elements of his farm, searching in every direction for appliances to improve and beautify it. A few dollars spent in the purchase of pictures, plants and flowers, will add much to the soul and pleasure of what we call home. External adornments are in the province of the farmer's department; shade-trees, green lawns, flowers, and good fences around the house, will excite admiration, while the owner and his family will all be more happy, and have more pride and true self-respect for their position than if the place had been left bleak and barren, without shrub or flower.

The farmer's wife—the mistress of the home—often has burdens greater than she can bear. She frequently works fifteen or sixteen hours a day, having scarcely any time for improvement or recreation. But if a woman marry she becomes an active partner with her husband, her share of the business falls most conveniently in the domestic labor of the household. We do not expect, nor do we want to see women doing the drudgery of the out-door work of the farm, as I have seen them do in many parts of Europe; but an hour or two once or twice a week, spent by the housewife in the open air, making the door-yard look tidy, and in the cultivation of flowers and small fruits, is time profitably spent. Home is thus made attractive to all the members of the household, and emulation is kindled in the hearts of neighbors and friends. It is a matter of fact, that, in many instances, while the farmer himself and his good-wife are struggling from year to year to make money and improve the farm, their sons and daughters are constantly learning to dislike the occupation and all connected with it. They paint to themselves, in imagination, the less laborious, more agreeable, and profitable occupations, and the more cheerful homes, and they long for the day to come when they can enjoy more leisure and more privileges, than they now have on the farm. We see young men pushing everywhere into trade, into mechanical pursuits, into insignificant clerkships, and salaried positions of every sort, that will take them into towns and cities. How are we to keep the young men on the farm? One way is for the farmer to have a greater respect himself for the business in which he is engaged. Another is to make home attractive to them. Why not give them a direct interest in the products of the farm? It will be an incentive for them to work better, save more, and plan as though it was to be a permanent arrangement. Do not ask your sons to wait until you are dead before they can own anything. "Waiting for dead men's shoes" requires too much patience for youthful minds. Amusements, healthful and mirthful, should be provided. In short, a farmer's home should be equal or excel in attractiveness that of any other calling. If you have such a home, your sons will not be likely to leave the farm, and you will not hear your daughters saying, "Well, I will never marry a farmer." The social intercourse of the "Grange," farmers' clubs, the meetings of neighbors and friends for mutual improvement, should be encouraged by the farmer and his family. Unless the farmer does this,—if he lives an isolated life,—his sons and daughters will say, "The country is dull," and will fly to the village for their social food.

Agriculture, as a whole, does not hold the same high position in this country as in Europe.

Let us devote our best energies towards elevating the business, enjoying it as we go along, leaving behind us, as we look back upon a well-spent life, some monuments of our faithful labors, in what we have contributed to make home and farm life attractive.

THE ESTABLISHMENT AND GROWTH OF AGRICULTURAL SOCIETIES.

From an Address before the Housatonic Agricultural Society.

BY HORACE J. CANFIELD.

Agricultural societies have increased with the general increase of the nation. They are now counted by hundreds. Every year they gather millions of property and hundreds of thousands of members and spectators within their hospitable gates. But the parent of this numerous progeny first saw the light in Pittsfield, and its first-born, springing to life here in this town of Great Barrington, and named from the "Housatonnuk River of our pride," has grown to a vigorous maturity, and, in the great family of agricultural societies, stands second to none in the elements of beauty, prosperity, and beneficence. Pondering such facts as these, you may suppose that I was not careless of the responsibilities devolved upon me, and at once chose a subject,—The Law of Heredity,—exactly suited to the time and place. But let me remind you that just then the notes of preparation for our National Centennial, which had been for so long a time sounding fitfully and spasmodically in the ear of the world, became sharp, distinct and clear. As the time approached, the omens all assumed encouraging and cheerful aspects. The national heart filled and overflowed with a pride and an enthusiasm which were genuine and not unwarranted. The world, with generous sympathy, approved the spectacle. The whole atmosphere was charged with patriotism, and we all felt and yielded to the influences of the time. Then came the "Fourth,"—the Centennial Fourth,—with its pomp and pageantry, in many cases, brilliant, beautiful and inspiring with its blare of brazen metals, and the glare of bonfires and illuminations; and, better than all,—more soul-stirring than all,—that undertone of song and eloquence which, all over the country, in fervent verse and dignified prose, recited the mighty deeds wrought by our wise and heroic fathers in the brave days of old. And here, permit me to pause a moment to recall to your recollections the name of that noble poet, whose venerable age almost spans the entire duration of our government, whose admirable life is honorable to human nature, and whose fame is one of the most excellent possessions of the Republic. His youthful mind was formed amid the scenery of Berkshire. As a citizen of your beautiful town, he made him friends of mountain and of glen, of brooks, and birds, and of flowers; and here and there, bit by bit, in a name, in a single phrase, or, now and then, in a poem, he has given the features of this lovely scenery an exquisite setting in his enduring verse. Bryant has friends the world over. Wherever literature is cultivated, and the noblest qualities of manhood respected, there is his name honored and beloved. But nowhere does he find a heartier appreciation than among the denizens of Southern Berkshire, who walk the paths which he once trod so lovingly, who hear the music of the same mountain streams, who pluck the asters and the golden-rod by the wayside, who climb to the same wood-crowned summits, who look in dreamy ecstasy across the wide expanse of flowery meadows, and gaze with equal admiration—though lacking the poetic gift—upon the splendors of our "Autumn Woods," when—

"Ere, in the northern gale,
The summer tresses of the trees are gone;
The woods of autumn, all around our vale,.
Have put their glory on."

His voice, too, was heard amid the chorus of our national festivities, and I repeat his centennial ode here, as forming, in some sort, the key-note of my address. The verses are familiar to you all. He turns, in a few stanzas, to the past and to the future. He utters words of thankfulness, of warning, and of hope. He recalls the blood and fire, the strifes and hopes of bygone years. He is not forgetful of our present greatness, he is grateful for our past success; but, with the enlightened vision of the true seer, he beholds in the dawning century the possibility of fairer, happier times.

> "Through storm and calm the years have led
> Our nation on from stage to stage,
> A century's space,—until we tread
> The threshold of another age.
>
> "We see *there*, o'er our pathway swept,
> A torrent stream of blood and fire,
> And thank the ruling Power who kept
> Our sacred league of States entire.
>
> "Oh, checkered train of years, farewell,
> With all thy strifes and hopes and fears;
> But with us let thy memories dwell,
> To warn and lead the coming years.
>
> "And thou, the new beginning age,
> Warned by the past, and not in vain,
> Write on a fairer, whiter page
> The record of thy happier reign."

And so, with these influences all around me,—with the most resolute determination to do a yeoman's duty here to-day,—I was swept away upon the current, and borne into the very centre of the patriotic maelstrom. My notes upon the "Law of Inheritance" lie tucked away, dust-covered, in a neglected pigeon-hole, and I am here to address you rather in your general character of citizens of "The Great Republic," than in your more special character as farmers.

One hundred years of independence! A hundred years of toil. A hundred years of manly and successful toil, crowned all along by golden and abundant harvests. The Centennial of American Independence! Let us rejoice that we behold this epoch, so freighted with refreshing remembrances of the past. A thought-compelling time. An era of memory, of recollection; recalling a long line of generous and heroic deeds; suggesting thoughts of triumphs; but not so much the brutal triumphs of the battle-field, as those better victories of peace;—triumphs of industry, of commerce; triumphs of the will over obstacles; of the mind over nature; of conscience over animal impulses; triumphs of benevolence and humanity. It is a time of good words, of congratulations and of eulogy. Let us drink inspiration from the inspiring past; and, being contented in the present, let us be fearless of the future, while resolving to do as our fathers did, to uphold the right at all hazards, and to overcome the evil with the good.

While contemplating the higher aspects of our civilization, the grandeur of our achievements, the might of our power, and the splendor of our wealth, we must be careful not to take too narrow a view. We must accord in some sort to others, that which we claim for ourselves. We must recognize the fact, that this hundred years, which has done so much for us, has been, likewise, to the nations of Europe, a cycle of unprecedented expansion. The whole civilized world has partaken of the impulse imparted by the invention of steam. There has been a general improvement, a general advancement, a general amelioration. We are called upon to recognize a universal benefit, to rejoice in an almost universal joy. "Commerce," as John Stuart Mill has nobly said, "first taught nations to see with good-will the wealth and prosperity of one another. Before, the patriot—unless sufficiently advanced in culture to feel the world his country—wished all countries weak, and poor, and ill-governed, but his own. But commerce has changed all that, and is leading up to a general recognition of that generous doctrine of the solidarity, the fellowship, the common brotherhood of man." The Christian Church claims this doctrine as its own. But it is one thing to have an elevating theory, it is another to live in accordance with it, to pray for it, and, better still, to labor for it; because actual striving towards a good thing is the better part of prayer. The physical world, when properly interpreted, reacts healthfully upon the moral world. A healthy material progress leads to better living and better doing. Commerce becomes the handmaid of conduct when she knits peoples together by the bonds of common interest. Nations, brought into closer relations, are learning slowly, perhaps, but still surely, to sympathize with one another's sufferings and distress. They also partake of one another's prosperity, and are co-workers in the task of diffusing comfort and happiness among men. Learning, as we are learning in this age, to entertain a broad and generous sympathy; rejoicing, as we are learning to rejoice, in the general prosperity of all, we are yet confronted by the fact that some races do not progress; that some never advance beyond the condition of savages;

that others, like the Asiatics, reach a condition of barbaric splendor, and then stop. We cannot discuss the point, but the Aryan,—a larger term for what we generally style the white race,—the Aryan race does progress. This race developed the civilizations of India and of Persia, of Greece and Rome, of Germany and France, of England and the United States. Whatever is most valuable among the possessions of mankind to-day, is the product of their active brains and industrious hands. From the remote past to the living present they have been toiling and striving, waging a ceaseless war against nature and circumstances,—

> "Ever reaping something new,
> That which they have done but earnest of the things that they shall do."

The struggle has been long, but what is strange, the Aryan race has gone forward more rapidly in the last hundred years than in all the past centuries of its history. Mr. Gladstone said, not long ago, that England had amassed more wealth in this century than in all the previous eighteen hundred years of the Christian era. Our own government has been founded, and our wealth developed, in the same period. Consider for a moment what this implies. Call to mind the number and extent of our canals; our steamboats, which have come into existence and have developed all their value, speed and beauty in one hundred years; our railroads, telegraphs, mills, factories, furnaces, machines, gas, chemicals, the products of one hundred years. The mind staggers under the magnitude of our achievements. To use a favorite phrase, we cannot "realize it" at a glance. The American boy looks out upon the world and feels that it always was as he beholds it. His aged grandfather takes his seat in a palace car and forgets that his birth was coeval with the steam-engine.

Mr. Hittell, a very valuable writer, recently gave some curious statistics relating to the world's progress in the last hundred years. In the middle of the last century a turnpike covered with gravel or broken stone was a rarity, even in the neighborhoods of the great capitals of Europe. Travellers then usually went on horseback. Not a hundred years have elapsed since the owners of riding-horses petitioned the English parliament to forbid the establishment of a stage-coach line, which had lately been started and was ruining their business. In 1760, England began building canals, and now six thousand miles have been constructed by the Aryans, at a cost of $500,000,000. The shipping of Christendom has risen from fifteen hundred thousand to fifteen millions of tons. Railroads, one hundred and forty thousand miles in length, have been constructed at a cost of $2,000,000,000. So also the gain in the materials for commerce has been immense. Steam-engines furnish a power estimated to be equal to that of three hundred million workingmen, and the saving of labor by other machines is probably almost as much. The annual consumption of iron has increased from two hundred thousand to twelve million tons. Our houses, our tools, our clothing, our food, our trades, and our professions, are different in many important points. Farmers have thrown aside the wooden plough within a hundred years. The wooden mould-board was excellent as compared with the barbaric plough which had no mould-board, and did not throw a furrow to one side, but merely scratched the ground, making a ridge on each side of the plough-point. While oak was the material, the farmer usually hewed or chopped out his own board, and fastened it on his plough; but both the shape and the adjustment were bad, and the surface, from the nature of the material, would never "scour" well in the moist earth. The iron mould-board was first appreciated and perfected, if it was not invented, in the United States. The superiority of the iron plough made a vast saving in friction; the furrow was turned over more regularly; the weeds were killed more thoroughly; the pulverization was better; and the working capacity of the ploughman, and the productive capacity of the soil, were each nearly, if not quite, doubled; so that now France, with a smaller number of men engaged in the business, yields three times as much wheat at an average harvest as it did about 1770.

Now, since the farmers are the largest class of producers, and the basis of national prosperity, and since ploughing is the most important part of their labor, the invention of the iron mould-board deserves to be considered one of the greatest contributions to modern civilization, ranking next to the steam-engine and to movable type, in its influence on the general condition of mankind. The impulse imparted to commerce by the introduction of the steamboat and the railroad is something marvellous. In 1770, the exports of Great Britain amounted to $65,000,000 ; in 1870, to $1,220,000,000. The shipping owned in England has increased from half a million to seven million tons. The amount insured—just think of this—the amount insured rose from $850,000,000 to $6,800,000,000. These figures are so vast that they make but a slight impression upon the mind. The intellect is confused and bewildered, as when it seeks for the first time to grasp the duration of the geologic periods, or the distance of the stars. With all this material development there has been a corresponding intellectual development. A large majority of our most instructive books are the product of the last one hundred years. Nearly all our prose romances, and most of our poetry, history and miscellaneous literature belong to this same glorious epoch in origin and spirit. We now write ten times as many books, and publish fifty times as many volumes annually, as they did in the last century. The United States turns out two thousand, and Great Britain four thousand new books every year, and the other Aryan nations probably bring the total figure up to fifteen thousand, whereas, before the middle of the last century, the number was probably not more than fifteen hundred. Besides the books, we have now seven thousand newspapers which are new, and in the aggregate furnish as much material for reading, and contribute nearly as much to education, as the books. But there is another point, interesting and of vital significance, to be noticed here. With this increase of material and intellectual riches, there has been a corresponding increase in the numbers of this active, energetic, and brilliant Aryan race. Within a hundred years it has increased from one hundred and twenty millions to three hundred and sixty millions. This is something altogether remarkable. Nothing of the kind has taken place before since the historical era began. The Roman empire had about one hundred and twenty million inhabitants, and the same territory, after a lapse of eighteen hundred years, had no more. Egypt, three thousand years ago, and Spain and Mexico before the Spanish conquest, had more inhabitants than now. This wonderful increase is due chiefly to the invention of steam. "As a general rule," says Hittell, "population has been nearly stationary; century after century has passed, with little difference, until we come within the magic influence of steam, and then suddenly the Ayran race, acquiring the power to draw larger crops from the soil, to distribute them more evenly, thus preventing disease and famine, and also to visit new and more profitable fields of industry, multiplies so as to keep pace with the increased supply of food, and with the demand for labor."

But with all this development, with all this unparalleled progress within one hundred years, there are elements of weakness in our civilization. Let us consider for a moment some of the characteristics of this Aryan race. It is not only the most active and intelligent, it is also the most stalwart of races. More even than this, the Aryan of to-day is more robust than his Greek and Roman predecessors. His civilization is more destructive, but his power of resistance is greater. Luxury is not enervating. A proof of this is seen in the fact that wherever the modern Aryan goes, among inferior races, he destroys them. Such was not the case in ancient times. We read of conquests then; of whole provinces overrun and subdued, but the inferior race survived; yes, survived, and assimilated with its conquerors. Now it is destroyed; it disappears not by the agencies of force, of cruelty, of bloodshed, but by simple contact with a superior civilization. In the words of Mr. Bageshot, "Savages waste away before modern civilization; they seem to have held their ground before the ancient. There is no lament in any classical writer for the barbarians. . . . . Modern science explains the wasting away of savage men; it says that we have diseases which we can bear, though they cannot, and that they die away before them as our fatted and protected cattle died out before the rinderpest, which is innocuous, in comparison, to the hardy cattle of the steppes." Mr. Francis Galton, upon the same point, though in a different vein, remarks: "The number of the races of mankind that have been entirely destroyed under the pressure of the requirements of an incoming civilization reads us a terrible lesson. Probably in no former period of the world has the destruction of the races of any animal whatever, been effected over such wide areas, and with such startling rapidity, as in the case of savage man. On the North American Continent, in the West Indian Islands, at the Cape of Good Hope, in Australia, New Zealand and Van Diemen's Land, the human denizens of vast regions have been entirely swept away, in the short space of three centuries, less by the pressure of a stronger race, than through the influence of a civilization they were incapable of supporting. And [he continues] we, too, the foremost laborers in creating this civilization, are beginning to show ourselves incapable of keeping pace with our own work. The need of centralization, communication and culture calls for more brains and mental stamina than the average of our race possess. An extended civilization like ours comprises more interests than the ordinary statesman or philosophers are capable of dealing with, and it exacts more intelligent work than our ordinary artisans and laborers are capable of performing. Our race is overweighted, and appears likely to be drudged into degeneracy by demands that exceed its powers."

Now, the currents of thought set in motion by such reflections as these, are manifold; but we must necessarily direct attention to one or two. Of their general truth there can be no question. That not only our statesmen and philosophers, but our average citizens, need a greater fund of ability and mental stamina, is manifested by the want, the misery, the degradation and the filth which exist in all the cities of Christendom, and which offend the taste and conscience of all self-respecting men. Yet the intelligence of man would seem to be sufficient to deal with these. Turn where we will, we can find defects and evidences of incapacity; and yet, when we view closely and calmly even the most flagrant examples of our shortcomings, they seem to take their origin in moral rather than in mental insufficiency. The profoundest miseries which either individuals or nations suffer from, arise from mistakes of conduct. And these mistakes arise not so much from weakness of intellect, as weakness of will. It may be true, that,—

> "The hands that rounded Peter's dome,
> And groined the aisles of Christian Rome,
> Builded better than they knew."

But the average man, and the man of lower abilities, act below their knowledge of the right. If statesmen compounded their conduct of conscience and capacity in equal parts, nations would be happier. And if the controlling notion in the performance of all work were the duty which one owes to others, rather than the advantage which may accrue to himself, our daily lives would be fuller of comfort and content. Our intelligence is limited, but still its boundaries are large, and its powers for good or evil incalculable, and a greater proportion of its strength should be turned to the controlling and the taming of our selfishness. Selfishness, though it be natural and the strongest, is yet the most ruinous and destructive element in human nature. Though it has its origin in the brute instinct of self-preservation, and though it be a necessary adjunct of human character, yet in civilized societies it should be tempered and refined by the strictest conceptions of justice and duty. From the very beginning of history, man's knowledge has been better than his conduct, and the hundred years just past have not differed in this respect from their predecessors. Let us take at random a few illustrations which exhibit some of the blots upon our civilization. We have read of mills in which stones are ground for the adulteration of flour; of plaster of Paris in mustard, which breeds wasting ulcers in the stomach; of candies and wall-papers colored with poisons. Consider for a moment the power for evil which the science of chemistry puts into the hands of immoral men. In its present state, chemistry is a new science. Its knowledge, properly used, brings with it beneficence and wealth. It ministers to all our industries, and to suffering and stricken man it comes like the spirit of God, with healing on its wings. But used by selfish men, swayed only by selfishness and greed, it becomes a gigantic instrument of disease and death. It adulterates, with injurious substances, our foods. It mingles subtle poisons with our drinks. There are acids, deadly poisons from which the whole body of brandies, wines, and cider are made. A leading newspaper said only a few days ago: "It is a truth which needs to be brought to public notice occasionally, that the brilliant-colored fluids which decorate the average bar, derive the least of their flavor from either grape or grain, but are the fabrication of so-called 'liquor compounders,' and are in reality mixtures compared with which the 'hell broth' of Macbeth's witches might be called an innocent and nutritious soup."

This is very bad, but the same kind of selfish immorality is found in every walk of life. . . . . You hesitate now about taking stock in any company. The reason is well understood. You have lost confidence. The career of the great railroad men and speculators in Europe and America, in part, explains the cause. How many corporations have been wrecked, how many families have been broken up, the happiness of how many individuals destroyed, by the speculations and the "corners" in Wall Street? Such transactions are entirely illegitimate. What is a "corner" but an attempt by men who have capital, and a certain knowledge, to rob those who have capital but not the knowledge? And we have "corners" in silk, "corners" in grain, "corners" in coal, "corners" in the luxuries and the very necessities of life. Last summer, when a yacht was wrecked off Staten Island, and a young, generous and wealthy merchant perished while endeavoring to rescue his wife, a sentiment of profound though smothered indignation pervaded the neighborhood for some time. Why was this? There exists a ferry-boat monopoly which oppresses the people who pass daily from Staten Island to New York, and this wealthy gentleman had established an opposition line for the relief of those people. It was believed that his yacht was wrecked designedly; that he, in a word, was assassinated, with his wife and friends, by the company which he had opposed. This suspicion was undoubtedly not true. But the astonishing thing is that it could be harbored; that public sentiment could be in such a state as to entertain such a suspicion, not deeming it improbable.

One more observation, and we have done. Alfred Wallace, one of the noblest spirits of modern times, spent several years among the savages of the Malay Archipelago, and contrasting the moral condition of those savages with the morality practised in Christian lands, he freely remarks: "It is not too much to say that the mass of our populations have not at all advanced beyond the savage code of morals, and have in many cases sunk below it. A superficial morality is the great blot of modern civilization and the greatest hindrance to true progress. During the last century . . . . our mastery over the forces of nature has led to a rapid growth of population and a vast accumulation of wealth; but these have brought with them such an amount of poverty and crime, and have fostered the growth of so much sordid feeling and so many fierce passions, that it may well be questioned whether the mental and moral status of our population has not on the average been lowered, and whether the evil has not overbalanced the good. Compared with our wondrous progress in physical science, and its practical applications, our system of government, of administering justice, of national education, and our whole social and moral organization, remain in a state of barbarism. . . . . And if we continue to devote our chief energies to the utilizing of our knowledge of the laws of nature with the view of still further extending our commerce and our wealth, the evils which necessarily accompany these, when too largely pursued, may increase to such gigantic dimensions as to be beyond our power to alleviate. . . . . Our vast manufacturing system, our gigantic commerce, our crowded towns and cities, support and continually renew a mass of human misery absolutely greater than has ever existed before. They create and maintain in life-long labor an ever-increasing army, whose lot is the more hard to bear by contrasts with the pleasures, the comforts and the luxury which they see everywhere around them, but which they can never hope to enjoy, and who, in this respect, are worse off than the savage in the midst of his tribe. . . . . This is not a result to boast of, or to be satisfied with; and until there is a more general recognition of this failure of our civilization, resulting mainly from our neglect to train and develop more thoroughly the sympathetic feelings and the moral faculties of our nature, and to allow them a larger share of influence in our legislation, our commerce, and our whole social organization, we shall never, as regards the whole community, attain to any real or important superiority over the better class of savages."

There is food for serious reflection in all this. Our moral theories have a very exalted character, but our practice is bad—very bad. Christians believe in the heinousness of sin.

They hold, for instance, that it were better for the sun and moon to drop from heaven than that one soul should commit a trivial sin, tell one wilful falsehood, although no one should be harmed by it. In contrast to this, Mr. Lecky says, "The time will doubtless come, when the man who lays the foundation-stone of a manufacture, will be able to predict with assurance in what proportion the drunkenness and the unchastity of his city will be increased by his enterprise. Yet he will still pursue that enterprise, and mankind will still pronounce it to be good." . . . . Now, there is a great and hideous discrepancy here; one for which there is but one remedy. Will society ever shape its conduct by the golden rule? "Love one another,"—not with word and tongue, but in deed and truth,—says the Christ. But what force have these commands upon society, as a whole? How far have they ever permanently influenced the rulers, and the legislators, the general politics, and the commerce of any country or of any age? When have the favored classes—the cultured, the intellectual, those rich by inheritance, and those preëminently successful in trade—shown an unselfish spirit? And yet society exists to secure the happiness, or, better, "the blessedness," of all. Ah! we are reminded here of some verses by a poor and suffering woman,—a child, rather, of sixteen years,—a "crazy" poetess, who had looked, however, deep into the heart of Christ, and then was frenzied by the cold selfishness of his Christendom:—

"They cry, 'He comes,—
The signs are sure: The mystic number is fulfilled,—
He comes.'
We answer: O, that He would come. We want
The Christ! We want a God to burn the truth
Afresh upon the forehead of the world!
We want a Man to walk once more among
The wrangling Pharisees, to drive the beasts
And money-changers from the temple courts;
To bring the Gospel back again, and prove
How all unlike the churches are to Christ!
We want that Christ to tell again the 'saints'
Their sins,—that they were sent to bless the poor,
And they have sold themselves unto the rich;
That they were sent to preach the works of peace,
And they have filled the world with war of words,
That they were sent the messengers of love,
And they have driven love out of their creeds;
That they were sent to teach men not to lie,
Nor tremble when their duty led to death.

O, for the Christ again!
Already Christ is coming. Hear ye not
The footfalls of the Lord?
He comes, the spirit of a riper Age,
When all that is not good or true shall die,—
When all that's bad in custom, false in creed,
And all that makes the boor and mars the man,
Shall pass away forever. Yes, he comes!
To give the world a passion for the truth,
To inspire us with a holy, human love,
To make us sure that, ere a man can be
A saint, he first must be a man."

It was Mr. Buckle who first drew a startling contrast between our intellectual progress and our stationary morals! He asserted that moral motives had exerted an extremely small influence over the progress of civilization; "for," he says, "there is unquestionably nothing to be found in the world which has undergone so little change as those great dogmas of which moral systems are composed. To do good to others; to sacrifice for their benefit your own wishes; to love your neighbor as yourself; to forgive your enemies; to restrain your passions; . . . . these, and a few others, are the sole essentials of morals; but they have been known for thousands of years; and not one jot or tittle has been added to them by all the sermons, homilies, and text-books which moralists and theologians have been able to produce. . . . . All the great moral systems which have exercised much influence, have been fundamentally the same; all the great intellectual systems have been fundamentally different. In reference to our moral conduct, there is not a single principle now known to the most cultivated Europeans which was not likewise known to the ancients. In reference to our intellectual conduct, the moderns have not only made the most important additions to every department of knowledge . . . . but they have created sciences, the faintest idea of which never entered the mind of the boldest thinker antiquity ever produced."

Now, all this is true,—true beyond a cavil, true beyond the peradventure of a doubt. But when Mr. Buckle goes on to say, that, "although moral excellence is more amiable than intellectual excellence, it is far less permanent and less productive of real good," we dissent. Nothing has a right to be, nothing has a claim to be, respected, which has not some principle of good as its essential element; and when an active moral intention shall enter into all our thoughts and words and works, we shall approach more nearly to the "ideal social state." We need no new moral inventions; we need to apply morality to conduct. One thing we must always bear in mind. Man's course is progressive. The vanguard of humanity is always passing—slowly, but surely, passing—from lower to higher, from glory unto glory. But many things which have served us in the past, retard our growth under new and higher conditions. In the last century, we erected a banner of "rights," and under that sign we conquered. "We hold all men heirs to certain inalienable rights," says the Declaration of Independence, and the formula has stimulated us to glorious achievements. But we should now take another step. The doctrine of rights has had its day. The doctrine of duties should be advanced to the front; and, with "duty" as our watchword, we shall advance to still grander and nobler victories. The highest right of man, is the right to do his duty.

I did not deem it out of place on such an important occasion as this to make a practical and philosophical review of our condition. Evils to be cured must be earnestly criticised. I have faith in the future, faith in humanity, faith in our country. I believe that man will enter upon a new and yet higher phase of action; that he will devote a larger share of his intelligence to the practice of morals; that he will yet ultimate his moral formulas in conduct.

CHANGES IN MASSACHUSETTS AGRICULTURE.

From an Address before the Norfolk Agricultural Society.

BY GEORGE S. BOUTWELL.

Farming, in the country sense of the word, is no longer a leading pursuit among you, and its relative importance diminishes each year. The farms have been divided for country residences and market-gardens, and the culture of the great staples of agriculture has been transferred to the interior of the State, and to remote sections of the Union. Land is too valuable for corn, grass, wheat, cattle in great herds, and even for the coarser and least valuable fruits and vegetables.

The changes of which I speak will continue, and coincident with them are two other changes calculated to exert considerable influence upon the fortunes and character of the people. There is a disposition among the farmers to abandon the habit of isolated family life, and to gather in or near the villages. This change springs not merely from the discomfort and exposure of isolated homes, but also from an increasing desire for education, for the education furnished by society, as well as that furnished by the schools. In the expressive language of the country people, the "outskirts" are to be deserted, and farms will be converted into pastures or surrendered to forests. These changes are not to be deplored.

Generally the best lands are in or near the villages of the farming towns, the selection of the site for the "meeting-house" having been the consequence of the selection of lands by the "most discreet of the freemen," which meant those having the keenest eyes for good land. Frequently, generally, the outlying lands fell to those who were least capable of managing them, and they have become exhausted by negligent culture. Until farming lands are quite valuable, nature can restore them more economically by a growth of wood than they can be restored by human skill or labor.

Fortunately for New England, we have for many years been surrendering our exhausted pastures and worn-out farms to the forests. Forests upon the tops and sides of hills and mountains are a certain source of moisture and nourishment to the fields below; they increase the quantity of rainfall; they add to the beauty of the landscape; they check the sudden flow of water to the valleys in the spring freshets, and they diminish the severity of the droughts in the summer and autumn.

Secondly, farming is becoming more and more an intellectual pursuit, and the aggregation of farmers in the villages is almost a necessary condition of progress. Not only are the children better trained in schools, but the men and women are insensibly educated by contact with each other, and especially are the men prepared for the successful prosecution of their business by conversation, by lectures, and by club meetings, which are now common among the farmers of Massachusetts. As the villages multiply in number and increase in size, the deserted lands may be again cultivated, and occasionally they will be purchased in large estates and devoted to raising cattle and grain. The tendency at present is clearly in the right direction.

I venture the suggestion that agriculture in Massachusetts, including market-gardening and fruit-raising, depends chiefly upon our capacity to gain and keep the lead in the application of scientific knowledge. In beef, pork, and mutton, in the culture of the grains, in the products of the dairy, we are in competition with the North-West and the West, even to California; while in horticulture and vegetables we are in competition with the Bermudas and the coasts of the United States, even to the tropical savannas of Florida. This is a serious competition, a perpetual competition. Railways and steamships have contributed to the growth—rapid growth—of cities and towns, but they have widened the field of competition and made it everywhere active. It is a competition of life, however, and not of death. The merchant and manufacturer must meet it; the farmer must meet it. Your markets are larger, but the supply and the sources of supply are larger also.

The three essential things in Massachusetts agriculture, in all its varieties of the field and the garden, are quality of production, quantity of crops, and economy of culture. Our proficiency in these particulars measures our ability to compete with rival producers, West and South. Assuming that, as farmers, we have capacity to use what is furnished, we must rely upon the inventor in the shop, and the scientist in his laboratory, for the chief aid in yet further advancing the art of agriculture. The improvements in tools have benefited every branch of agriculture, but more especially the great operations of the prairies, as compared with the culture of the gardens and small fields of the East. These advantages are likely to continue, and they may even increase. On the other hand, I anticipate that the application of science and scientific discoveries to agriculture will inure more largely to the advantages of the East,—to the small farmers and market-gardeners of the country.

Perhaps I ought, without an if, to say that Prof. Stockbridge's discovery of a special fertilizer for corn will yield a return to the State in excess of the cost of the Agricultural College; but as a phrase of caution, I say, if, after a reasonable trial, which shall decide, among other things, the effect of successive crops upon the productive powers of the soil, the claim now made for it shall be sustained, its value to the State will far exceed the cost of establishing and maintaining the college at Amherst.

I believe that the average farmers of Massachusetts, and especially dairy farmers, who use corn as feed for cows, have erred in abandoning the crop. Next to hay, the corn crop is of the most value to the farmer whose chief product is milk. It is adapted to many varieties of soil; it is subject to but few casualties; almost uniformly it is proof against disease and insects; the straw, if properly treated, is almost as valuable as hay, and the grain, after making all proper charges and deductions, can be raised at a cost not exceeding the average cost of Western corn.

Moreover, the annual product of hay will be greatly increased if the cultivation of corn is pursued, for it may safely be said that no other crop which does not require higher treatment and better tillage so well prepares land for grass. This statement I base upon the common system of culture; but should the claim for the Stockbridge fertilizer be sustained by experience we may defy the competition of the West as far, at least, as our own wants are concerned.

My confidence, however, goes far beyond what is established or even claimed for science in its relations to practical agriculture. I now see, what in the beginning I did not see, that the apparent value of the Agricultural College will be greater in the region of scientific discovery and invention, and their application to practical agriculture, than in the preparation of young men for the management of farms. The latter idea was the English and continental idea, and in the beginning it was the American idea; but the indications are that the advantages will be more largely in a quarter which at that time was not much considered by most of us.

I have recently returned from Central New York, where I was assured by persons of respectability and information that the advantages of the investigations and teachings of the professor of the Cornell University, in the department of the dairy, would far exceed the cost of the Agricultural College. These are the beginnings, and we may safely prophesy that the agriculture of the future will be, in its main and most profitable branches, only a system of applied chemistry. This does not imply that every farmer is to be a chemist, nor indeed that any farmer need concern himself with the science at all. But as every farmer will be called to consider the value of the science in its applications, it will follow that many, and especially many young men, destined to engage in agriculture, will become interested in and students of the science.

The knowledge of a valuable thing is of the first importance, but second only is its diffusion among those who can derive advantage from it; and especially its diffusion in an authoritative and a responsible manner, so as to command the confidence of those who are concerned in its application. For the most part, farmers have neither the disposition nor the means to try experiments, and they have so often been the victims of imposition that they are suspicious of new projects, and they hesitate to engage in new undertakings.

For the first time Massachusetts was this year visited by the Colorado beetle, and our farmers were left to experiments and to crude suggestions, when, as I am informed, the best methods of resisting its ravages were understood in the West, and particularly by the officers of the Agricultural College of Michigan. The absence of this information, which might have been given with authority, so as to have commanded universal confidence, must have cost the State many thousand dollars in crops and in fruitless experiments.

The Agricultural College at Amherst is in existence, and it should be made as beneficial as possible to the interest which it represents, and which it is designed to promote. The suggestion which I make to-day to the farmers of Norfolk is, that they consider whether the power of the college may not be greatly increased without serious additional expense to the State. Whether its force of professors might not be so enlarged that a number, three or more, might be constantly employed among the farmers of the agricultural sections of the State. The summers could be devoted to observations and to examinations of soils, crops, tools, cattle, modes of culture, markets, and, indeed, to anything touching the production and disposal of farm products; and the winters to lectures and conversations to and with the farmers in the agricultural districts upon every topic concerning their progress and prosperity.

The farmers are already active in the work of self-culture, but they cannot take the lead in improvements which are purely scientific, nor can they always wisely judge the value of suggestions made by others. Scientific men, accredited by the State and by the college, would be entitled to their confidence, and I cannot doubt that the results of the labors of a small number of such men would many times exceed the cost. The competition of the hands—of the hands merely—is nearly over in this country, and in the countries with which we are in commercial relations. The competition is moral and intellectual, and, other things being equal, or nearly so, those States and nations will take and keep the lead, where the people enjoy the highest average moral and intellectual culture.

We must not, as a nation, accept the Asiatic idea, now largely controlling and crippling Europe, that an increase of population is necessarily attended by a reduction of the wages and the comforts of the mass of the people, and their gradual decline in intelligence and morality. These tendencies cannot be arrested by the government, if its form alone, as whether it is a republic or a monarchy, be considered; our chief ground for confidence must spring from institutions and policies promotive of universal education and the general diffusion of knowledge.

ORIGINATING NEW POTATOES.

ESSEX.

An Essay by James J. H. Gregory.

Since the general prevalence of the disease popularly known as the "potato rot," which virtually annihilated some standard varieties, and so seriously affected the health of others as to render profit in their cultivation precarious, the public have given great attention to the originating of new kinds, with the object of obtaining in these a constitutional vigor that should manifest itself in greater productive powers, better quality of tuber, and greater capacity to withstand disease. The result of these most laudable efforts has been to give, within the past dozen years, thousands of new varieties of potatoes.

Among these, about two dozen stand out prominently as decided acquisitions, and have nearly replaced all the kinds known previous to that time as standards. How vast a gain these new varieties, from their greater productiveness, have been to these United States, may be inferred from the fact, that an annual difference of but a few bushels to the acre makes an addition of millions of dollars in the agricultural returns. Another fact bearing on the importance to agriculture, of encouraging the originating of new varieties, is found in the fact, that, at the present day, most if not all of them appear to be so far weak in their constitutions, that they deteriorate either in yield, quality, or keeping properties, earlier in their history than was the case with the standard kinds before the dread "potato rot" appeared. There being, therefore, this necessity for new varieties, it appears but wise that all who make efforts thereto should be informed of such facts as observation and experience have to contribute. It is therefore proposed in this paper to contribute a few facts, observations and reflections bearing on this subject, to the end that efforts to produce new seedlings may be more intelligently directed than is often the case.

If the various new seedlings that have become established in the community by reason of their real merits be classified, it will be found that nearly all of them originated in a latitude north of Southern New York. If, with this fact, we connect one other; viz., that the natural home of the potato is on the high, cool table-lands of South America; and yet a third fact, that taking any variety of the Irish potato, we find that, all other conditions being equal, the farther north it is grown, the better is its quality, I think we may conclude that to develop the best results possible in raising new seedlings, the experiments had best be confined to latitudes north of Central New York. If, now, we analyze this matter a little farther, and classify the various new sorts that have become standards, and do this in the light of the number of seedlings raised by seed cultivation, to each new one of real merit obtained, we shall find that by far the greater success has been achieved in the northern section of this area. In support of this position, we need only take for illustration the experiments of the lamented Goodrich of New York, and of Albert Breese of Vermont. Mr. Goodrich, out of thousands of seedlings, obtained half a dozen standard kinds, while Mr. Breese, out of less than a dozen, obtained at least three seedlings, that, either universally or in large sections of country, are recognized as standard varieties. Such wonderful results as were obtained by Mr. Breese, are, it is true, rare; but taking the fact in connection with another, that so many of the standard seedlings, now and formerly before the public, such as the old Chenango, Orono, Excelsior, Early Vermont, and Snowflake, originated in the northern portion of this area of country, I think we may advance a step farther in our suggestions, and state that, within the area north of the latitude of Southern New York, those dwelling in the northern portions have, probably, the best chances to originate first-class seedling potatoes.

We now propose to discuss: 1st. What is required in a new seedling to make it an acquisition? 2d. What steps are most likely to produce such a seedling?

1. What is required in a new seedling to make it an acquisition? The requirement in a potato, to be accepted by the public as a standard, is, that while it equals standards already accepted in other characteristics, it shall also excel them in one or more. Now, the characteristics that make up a model variety, relate to yield, quality, flavor, freedom from rot, shape, size, color of skin, number of eyes, depth of eye, color of flesh, keeping properties, soundness at the heart, earliness or lateness of maturity, manner of distribution in the ground, and habit of growth of the vines. I think that it may be assumed that, before any originator has the right to send forth any new variety as an acquisition, he must be able to demonstrate that his *protégé* is a decided acquisition in some one of these characteristics, and fully up to the average in the remainder. In determining this, he must make more than a comparison on his own grounds, for, from the discrepancy between the results that some originators state they find in a comparison between their seedlings and the standard sorts, and the results that others find when they make the same comparison, it is evident that it is true of seedling potatoes as with seedling strawberries, new varieties will often do their best on the land where they originated. I would here suggest, that it may be a wise step for growers of new varieties to state the kind of soil in which they originated, as the point is not yet settled as to whether or not new sorts do their best in the same soil on which they originated.

From an experience in testing hundreds of seedlings sent to me from different States, in the course of several years, almost all of them claimed as decided acquisitions by their sanguine originators, I deduce the following suggestions relative to the various characteristics required in a new seedling before its claim to be admitted as a standard variety should be allowed. Taking them in the order given, the yield, under good cultivation, should be *at least* two hundred bushels to the acre. Fancy cultivation of small area will at times give a yield of three or four hundred bushels to the acre, when the same variety, on good potato soil, with good average manuring and cultivation, will fail of yielding two hundred bushels. The flavor and quality, by which latter word I more especially mean dryness, should be up to such a standard as the Jackson

White or Chenango of olden time. For a standard of shape, a medium between the standard oblong and round varieties is most desirable, as there is the least waste in the paring of potatoes of this form, while a larger proportion of the smaller ones will be marketable. Here let me remark that I have noticed that oblong potatoes that are usually equally large at each end, oftentimes under unpropitious circumstances, grow smaller in the middle than at the ends, which makes any potato unmarketable. Another fact noted is, that any variety that tapers to a small and rather projecting point where the stem is attached, is apt to sport in its form, and is unreliable as a cropper. Another fact is, that while all varieties of potatoes that have had their growth stopped by drought before maturity make the remainder of their growth when they start anew after a rain by additions which farmers designate by the word "prongy," some varieties are far more inclined this way than others. In size, while it is absolutely necessary that they shall average as large as the average of accepted standards, it is also necessary that the large ones shall not be excessively large, and the small ones not more numerous than those of the average of received standards. The color of the skin is much a matter of fashion. When the Early Rose first came before the public, many prominent dealers said it would not be accepted, as the public wanted a white-skinned potato, after the style of the Orono. Now, I have a letter of inquiry for a potato equally good as a white variety, cultivated by an extensive grower, but with a change of the color of the skin to red, as the Early Rose has trained the public to red as the standard of color. Of the eyes, an unusual number, and especially an unusual depth, is undesirable, from the greater difficulty and greater waste to the housewife when peeling for the table. The color of the flesh should be the most snowy white, except it may be when designed for a Southern market, where I understand the general preference is for a yellowish fleshed potato of a waxy structure.

Hollowness at the centre, except in overgrown specimens, should be a fatal fact. Good keeping properties demand that they should not acquire bitterness with age, the capacity to keep free from sprouting, other conditions being equal, turning, as far as my experience goes, on the earliness or lateness of the variety. Of the distribution of the potatoes in the hill, compactness is desirable, as the labor of digging is much lessened, and also the liability to cut the tubers. This compactness of the Early Rose, lying in a mass as in a pocket, is an excellent characteristic, while the Shaker Fancy is an illustration of an erratic distribution. Of the habit of growth of the vine, the short-jointed, compact growth, of which the Excelsior is a good illustration, is desirable, as such a habit admits of greater ease in the cultivation of the crop.

While these are the desirable qualities in every new seedling which applies to be admitted as a standard, and while many of these characteristics are absolutely essential, yet were a variety presented that excelled to a remarkable degree in the leading points of a good potato, the public would be ready to waive many minor points in its favor.

The late Mr. Goodrich, who had a far larger experience in producing new seedlings than any other man in the United States, gave, as the result of his observation, that a seedling potato was liable to sport in shape until the fourth year; in other words, it did not acquire its true normal shape until the fourth year from the seed. From the great number of seedlings introduced the third year from the seed, it is to be presumed the public lack either faith or information on this point.

Having presented the characteristics of a seedling potato worthy to be admitted among the standard kinds, the question naturally arises, Can experience or science help the persevering cultivator to the attainment of such a model? I think each can help somewhat. In my own experience, I have found that there is a great tendency in some varieties to repeat themselves; such, for an instance, as the Orono. And here let me put in a word of advice. It is not desirable to have a seedling follow too closely its parent, for the result is apt to create confusion and dissatisfaction with the public. It is unfortunate that that excellent variety, Early Vermont, should so closely resemble Early Rose; and for this same reason, a dozen or more seedlings of Early Rose, which I have tested the few years past, with the single exception of

Early Ohio, have differed so little from their progenitor as to be practically worthless.

The procuring tubers of the native wild stock, on the plateaus of Peru, and the raising of seedlings from these, has not, so far as my knowledge goes, given the satisfactory results anticipated. In Mexico, varieties of potatoes are grown which have never suffered from the rot. Should this great plague again become prevalent, this may be a good source to obtain potatoes from which to raise new seedlings.

Science suggests that the pollen of choice varieties might be crossed, and thus choice seedlings be ensured, and I have known of one experiment in this direction which promises well; yet the sum of extensive experiments in this direction may be like those of the distinguished Van Mons of Belgium with the pear,—from many thousands of trials he secured as result but two or three high-class pears; while another cultivator, among comparatively a few chance seedlings, produced more and better varieties than his distinguished cotemporary.

COMPARATIVE VALUE OF CROPS AS FOOD FOR CATTLE.

ESSEX.

An Essay by Ansel W. Putnam.

During the year 1875, the "American Agriculturist," in articles from Professor Atwater, gave to practical farmers the fundamental principles by which they may determine the value of crops as food for cattle.

The corner-stone upon which economical feeding rests, has been discovered, and is composed of albuminoids and carbo-hydrates, mixed in certain proportions. For dry cows, and oxen at rest, the ratio may be one of albuminoids to eight of carbo-hydrates. For oxen at hard work, and milch cows, one of albuminoids to four or five of carbo-hydrates. German experiments have proved that it is as important to have these elements in about the right proportion, to get good results from feeding, as it is to have lime and sand in about the right proportions to make good mortar.

If crops, having an excess of albuminoids, are fed by themselves, a part of the albuminoids will be lost for the want of carbo-hydrates to unite with, as a part of the lime will be lost in making mortar, if there is not the proper amount of sand for the lime to unite with. Also, if crops, having an excess of carbo-hydrates, are fed by themselves, a part will be lost.

As it is a loss to the bricklayer to have pebbles in the mortar that he must pick out from under every brick, before it can be laid, so it is a loss to have large amounts of indigestible material mixed with cattle-food.

Perhaps good food for cattle may be defined as that in which the albuminoids and carbo-hydrates are in the right proportion, and a large per cent. of the fodder digestible.

By mixing cotton-seed meal with wheat or rye straw, all the digestible carbo-hydrates of the straw can be utilized; but as about one-half of the straw is indigestible, under any conditions, it will not become first-class food, even with the cotton-seed mixed with it.

The scientific question of to-day is not, "What is any crop worth when fed by itself, as compared with good English hay?" but rather, "How can we grow, harvest and mix other crops, so as to make them equal to English hay?" Good pasture-grass—that is, grass that is eaten in a week after it is grown—is the most perfect food for cattle. The elements are in the right proportion; it is easily digested, and a very large per cent. of it is digestible. Very early cut, well-cured English hay is the best dry food, if but one kind is to be used.

For making milk, in ripe hay,—except, perhaps, that made from Hungarian grass,—in corn-fodder, and in corn-meal, there is not enough of the albuminoids to use up all the carbo-hydrates. It is probable that a part of the nutritive value of much of the corn-meal, corn-fodder, English hay,—from being too ripe,—salt hay and fresh meadow hay, fed in Essex County to-day, is lost for the want of albuminoids.

Professor Atwater says, "There are two great sources of loss in our common systems of feeding. One is, that we often fail to have enough albuminoids in the food to secure the most complete digestion. Another is, that forage crops are not cut when young and easily digested, but are allowed to stand until they are nearly ripe, and much of their material has become indigestible, and, of course, nearly useless as *nourishing* food."

I look upon the discovery of this loss in stock-feeding, together with the discovery of how this loss may be saved, as one of the greatest discoveries of modern times.

Decorticated cotton-seed meal and Hungarian grass are sources from which plenty of albuminoids may be drawn to utilize our carbo-hydrates. One hundred pounds of the best cotton-seed meal has twenty-eight pounds of digestible albuminoids and seventeen of carbo-hydrates. Now, as it needs but four pounds—even when used for making milk—of albuminoids for its own carbo-hydrates, it has twenty-four pounds of surplus albuminoids in every one hundred pounds that may be used to utilize the carbo-hydrates of crops deficient in albuminoids. Take first-quality salt hay, for example. It has 3.4 pounds of digestible albuminoids and 41.6 of carbo-hydrates in one hundred pounds. It needs, say ten pounds of albuminoids to make its 41.6 pounds of carbo-hydrates available for making milk, or about six pounds in one hundred short. The twenty-four pounds of surplus in one hundred pounds of cotton-seed will supply what four hundred pounds of salt hay needs to make it good milk-making food.

Hungarian grass has nearly twice as much albuminoids as it needs for its own carbo-hydrates; therefore, a ton of good, early cut Hungarian grass, mixed with a ton of *good* salt hay, will *probably* make as much milk as two tons of average English hay.

There is much probability, as yet, about the proportions in which to mix our crops to get the best results; the quality of crops varies so much, when grown and harvested under so many different conditions, that there will be many problems for each farmer to work out for himself, after getting all the information he can from the chemist and the experiment-stations. My object in writing is to induce the farmers of Essex County to work out the problem, how best to utilize the fodder they have, or can get most conveniently. Let each one solve the problem for himself, and follow the practice best suited to the conditions of his farm.

I wish to call attention to *principles*, and do not intend—for I am not prepared—to give rules for any one to work by. Dr. E. L. Sturtevant, in the July number of the "Scientific Farmer," gives us a very valuable article on Hungarian grass, and says, "As the feeding values of articles are usually calculated on the percentage of albuminoids, these analyses would indicate a higher feeding value than we usually see ascribed to millet. It is hard to believe, but it must be at least equal, and probably better, than grass; but, if to such an extent as is here shown, whence the discrepancy of opinion in the practical estimates?" As I understand the principles given us by Professor Atwater, the analysis of Hungarian grass does not show that it is better, or even equal, to grass, if fed exclusively by itself; for then about one-half of its albuminoids is lost. The beauty of the value of good grass is, that the nutritious elements are in the right proportion; it is good food by itself; it asks nothing from any other crop, and it has nothing to give to any other crop. But to get the full benefit of Hungarian grass, it must be used with some crop deficient in albuminoids.

Dr. Sturtevant asks, "Whence the discrepancy of opinion in the practical estimates?" I answer, because of the different conditions under which it is grown, harvested and fed. Some let it get quite ripe,—think it better so than green,—and if it is to be fed by itself, it may be well to let it stand longer than most crops, for, after it is ripe, it probably has enough albuminoids to utilize all its carbo-hydrates; but there is a loss in letting it ripen, because a much larger per cent. becomes indigestible. A better way is to cut it young, and then feed it with something that needs what it has to spare.

One important and fundamental principle which underlies the securing of good fodder, has been discovered and clearly proved to be correct by the German experiments. It is this: the younger any crop is cut, the greater its ratio of albuminoids, and the greater the per cent. of digestible to indigestible matter. This shows us why it is that our cows give us most milk in June, when the grass is growing fast enough for them to fill themselves one day with what grew a few days before. They always eat the youngest that is to be had, and the younger the grass they eat, the more milk they will give. I know Dr. Nichols, a chemist and practical farmer, and Dr. Loring, a practical and scientific farmer, have taught the reverse of this.

Dr. Nichols, at the meeting of the State Board of Agriculture, at Fall River, said: "I find that corn-fodder, sown broadcast, is perfectly worthless. I demonstrated that practically by experiments upon my herd of cows, and I demonstrated it positively by an analysis of the plant. The results of my observations and researches, up to the present time, have been these: that in raising fodder-corn, we must allow it to reach a certain point before we cut it. In the first place, we must sow it in drills; it must have access to sunlight and air, and it must be allowed to proceed to a certain stage,—

and that stage is the formation of the ear,—before we begin to cut it. Corn-fodder fed to animals before that period, will not increase the milk."

At the same meeting, Dr. Loring said: "Now, every kind of grass has just so much nutriment in it. You want to get rid of the refuse, the woody fibres, and save the sugar, starch, and soluble salts, that go to make up the nutritive properties of the plants. . . . . Immature grass is very deficient in the nutritive elements that I have spoken of; every chemist knows it. . . . . You cut, for instance, a large crop of rowen, which is entirely immature, and every farmer knows that it is the most unprofitable thing he can put into his animal. An animal fed on rowen will make an abundance of everything else but milk or meat."

Thus Dr. Loring and Dr. Nichols, in 1871, called both chemistry and practice before the State Board as witnesses to prove that immature grass and immature fodder-corn are not good. Although the testimony of these witnesses now looks to us practically erroneous, yet, from a certain scientific stand-point, they were then, and are now, scientifically correct; and my object in making the quotations, is to show wherein they are correct, and where erroneous. Take the corn sown broadcast, for example. It may be very thick, and it may be of the Southern or Western variety, and both practice and chemistry have proved that it may be cut young, and make *first-quality* milk-producing food; but let the same crop stand a few weeks longer, and it will get into a condition that "will not increase the milk."

There is a time in the growth of the corn plant, when it has grown all the leaves that belong to the butt-stalk. Up to that time it has been the work of the plant to grow leaves filled with elements to be used later in the growth of the plant. After all the leaves that belong to the butt-stalk are grown, then the process of hardening the stalk begins. Indigestible matter is rapidly formed, the nutritive matter that was in the leaves is rapidly drawn upon by both stalk and root, and the leaves become like a honey-comb, with the honey drawn out. Now, if we wait until this change has taken place before we use our thickly sown fodder-corn, it is nearly worthless; but if we use it before it has finished growing its butt-stalk leaves, every part of it, from tip to root, is as good as any part is when the ears are formed.

There are two ways to grow good fodder-corn, and the way Dr. Nichols recommends is one of them. He says, "We must sow our corn—the sweet variety—in drills, and not sow it too thick." One reason why we get good fodder in this way is, by sowing thin in drills, the corn has a chance, after it has grown its butt-stalk leaves, to go right on growing top-stalks and husks, and if we begin to use it before the top-stalks and husks have poured their contents into the ear, we get the same quality of fodder that we get before the butt-stalk leaves discharge their contents.

Another reason is, by using the sweet variety, the stalks do not become as hard and indigestible as when the harder varieties of corn are sown.

But my cows, and the French chemists, tell me there is a way to get as good fodder, and in about one-half of the time, and that is to sow Southern or Western corn thick, and use it before it has finished growing its butt-stalk leaves.

There are two ways to have *very poor* fodder-corn. One is to sow it thick and not use it before the stalks have hardened. If the corn is very thick, it cannot go on and make the perfect growth of top-stalks and husks which make such good food when it is thin.

Another way is to sow the Western corn thin, and let it stand until the ears are formed, and the butt-stalks are too long for cordwood, but not quite large enough for good saw-logs. The same principle of discharging the contents of the leaves applies to Dr. Loring's rowen. As I understand the laws of growth, the object of the first growth of leaves in the season is to help grow seed-stalks and mature seed; but as far as the welfare of the plant is concerned, the late growth, or rowen, is mainly to strengthen the roots for the next season.

Mr. Johnson of Framingham, at the same meeting in Fall River, said, "August is the time for our grass to start for next year." Very few farmers as yet give the grass roots the benefit of that start, or anything as a substitute for it. Rowen may become over-ripe for fodder, as well as the first growth, or as fodder-corn may; but the contents of the leaves, instead of going into stalks, return directly to the roots to be utilized in the spring, by giving the plant a thrifty start. If we wait until this return process has taken place before we cut our rowen, we have a lot of empty cells. But cut it when the leaves are full, dry it well, and it will be as palatable and profitable to the cow that eats it as the full honey-comb is to the dearest lover of sweets that can be found.

Two years ago I was sadly disappointed by losing the milk from a heavy second crop on a field mowed early in June, and which I intended to feed down close and plough in the fall. The season was wet, grass grew finely through the summer, and as I had plenty of green food without pasturing that field, I thought I would save it till after I cut and fed the rowen on the later-cut fields. When I turned the cows into that lot, I supposed I should get an increase of milk; instead of that, ten cows shrunk twenty quarts a day—an average of two quarts each. It took me some time to answer to my own satisfaction why. The solution, as I understand it, can be gathered from what I have said about over-ripe rowen.

All difference of opinion as to the comparative value of crops as food for cattle, will be harmonized when all conditions relating to the different crops are well understood, and all will be found valuable when we know how best to utilize the good that is in them. The questions that arise about full and empty leaves are important, and we need more knowledge before they can be correctly answered. The mixing of different crops to utilize the surplus elements of each, is a very important matter, and I wish particularly to call the attention of such as have salt hay and river meadow hay to use, to the fact that if cut at the right time and well cured, the carbo-hydrates in them are worth as much per pound as in English hay. The best quality of mixed salt hay, according to Professor Storer of the Bussey Institute, has 41.6 pounds of carbo-hydrates in one hundred pounds; black grass has 43.8 pounds; best upland hay has 43.1; medium quality has 41.1; fresh meadow hay has about the same; the best upland hay has about nine pounds of albuminoids in one hundred pounds; and the best salt hay and meadow hay have about three pounds. Six pounds of albuminoids in one hundred pounds is mainly what makes the best upland hay better than the best salt hay. Medium quality of upland has 5.4 pounds of albuminoids, 41.1 of carbo-hydrates, ratio about one to eight, —the proportion that is right to keep dry stock in fair condition. Practice for years has proved that dry stock will do very well on plenty of medium quality upland hay. As salt and meadow hay need but two pounds additional albuminoids per one hundred pounds to make the ratio right for dry stock, and as cotton-seed meal has twenty-six pounds in one hundred to spare, if fed to dry stock, it follows that thirteen hundred pounds of salt hay, or good river meadow hay, mixed with one hundred pounds of cotton-seed meal, is equal to fourteen hundred pounds of medium quality upland hay. If this is so,—and I ask the farmers of Essex County to prove that it is or is not,—then it must be economy for those farmers who have been in the habit of wintering their stock on salt and meadow hay, and have them very poor in the spring, to sell part of their hay, buy cotton-seed, utilize the carbo-hydrates of what they do feed, and have their stock fat, sleek, healthy and happy, profitable to their owners, and a credit to the county. If this essay shall be the means of leading one farmer to feed his stock so as to better supply their wants and make them more comfortable, the writer will be well paid. It is well to know the conditions under which wheat-bran is more economical than corn-meal.

When they are fed so as to utilize all their nutritious elements, their value is as five to seven; thus, if wheat-bran is worth $20 per ton, corn-meal is worth $28 per ton; but as the bran has a surplus of albuminoids, there may be conditions in which a ton of wheat-bran will make more milk than a ton of meal; thus the farmer needs to know the composition of the material he is to feed with his grain, before he can tell which it is best for him to buy, at the market price.

Knowledge of how and when to use roots for stock, is important. To feed any of the beet family with average quality English hay and corn-meal, is very unprofitable, because beets are deficient in albuminoids, much more so than turnips, but all roots can be used to the best advantage with poor hay and straw, together with grain rich in albuminoids. This is so, because in poor hay and straw the per cent. of indigestible organic matter is large, in all root crops it is small, and by feeding them together, the per cent. of indigestible matter is reduced; and if care is taken to get the proportion of albuminoids and carbo-hydrates right, roots are profitable. This shows us why it is that the English buy so much of the American oil-meals. Their climate is well suited to turnip growing; they feed turnips with their straw to get the proportion of digestible matter right, and feed oil-meal to get the proportion of albuminoids right. Whether it is economy to grow roots, depends upon what one has to feed with them.

There are other branches of this subject which it would be pleasant to follow, but space forbids.

SOILING CATTLE.

HAMPDEN.

From an Essay by A. L. McKinstry.

How Six Acres can Summer Twelve Cattle.—My stock consists of ten milch cows, a three-year-old bull, and a yearling calf, all more or less of the Alderney breed. They were first turned to pasture May 15th last, in a lot that was being ploughed, and they received a little meal each day.

May 25, commenced mowing and feeding green rye, and so continued till 1¾ acres had been fed, or till June 15, when it being too tough to be relished, the balance was hayed.

June 15, the cattle were turned into a two-acre pasture near the barn, and this was used for a pasture through the summer. June 24 to July 7, mowed and fed three-fourths of an acre of green oats, when they became hard, and the balance, one-fourth of an acre, was hayed. From July 7 to 14, green grass was mown and fed. Commenced on fodder-corn July 14, and this, with the help of an acre of clover, mown from the oat stubble, lasted till October 5. From this last date till they went into winter quarters, rowen hay, cabbage-leaves and turnip-tops were given them.

To make this more plain I will state that one and three-fourths acres of rye lasted twenty days; two acres of pasture, nine days; three-fourths of an acre of oats, twelve days; and one-half acre of grass mown and fed, seven days. The first acre of corn was consumed in twenty days.

From the 25th of May to the 5th of October, a period of one hundred and thirty-three days, the crops from nine acres were consumed, which showed as follows: 1¾ acres of rye, three-fourths acres of oats, 3½ acres of grass, including the pasture and three acres of corn. But as all but three acres produced two crops during the season, the actual amount of land used was six acres. It may be well to state the following particulars in regard to the soiling crops.

One acre of the land which was in turnips was sowed with rye, a cultivator being passed between the drills to cover the seed. The other acre of rye followed potatoes, and was sown so late that it barely sprouted before winter. It came to maturity late, as was expected, and was withal a poor crop. The acre of oats received six cords of manure. On one side it was ploughed in, but on the other side of the piece it was harrowed in. Three bushels of seed proved to be the right quantity. We found the best looking clover where the harrow was used to bury the manure, but the oats were the best on the other side. The first corn was planted at the rate of two bushels of Northern corn per acre, in drills three feet apart, which were manured with three cords of manure in the drill. Sweet corn was used entirely for later planting, with the exception of a little Southern corn, which was planted July 20. We commenced cutting rye and oats as soon as the first heads began to appear. As the crop approaches maturity, it becomes woody, and the same bulk produces less milk. It is therefore an object to select a dry day and mow a quantity, which after it is wilted may be made into small cocks, where it can remain a number of days until needed. Neither of these crops should be allowed to blossom. Corn should be planted, as some of our countrymen are charged with doing their voting, early and often. We have found sweet corn to come on a little later than the common variety, but it produces more fodder, and is always eaten up clean. The management of our stock during the summer has been as follows: they are fed in the barn at night and in the morning following with fodder which was cut in the middle of the day so as to avoid the dew. The cows are let out into the pasture, where they spend the middle of the day. We have found that cattle, like their owners, tire of one kind of food, and if allowed to feed by the roadside, as we sometimes did for an hour, it gave them a relish for their ordinary diet. The cows were confined in the stables by stanchions. In their rear was a water-tight gutter, two feet wide and one foot deep; this usually received, every second day, ten wheelbarrow-loads of dry muck. This was just equal to the task of absorbing the liquid and keeping the stable passably dry. The foregoing outline of our practice, I think, might be improved by adding, during the summer, a daily feeding of wheat-bran, which would supply the manure with phosphates that are carried from the farm in the milk.

In regard to the economy of soiling, it can be said that it effects a saving of land and manure, but requires an increased expense for labor. An observing neighbor remarked with reference to the production of milk, that in May and June the advantage was with the pasture, but thought he obtained more milk in the course of the season by soiling and feeding in the barn. The epicure remarked, while helping himself to the middle of the fish, that the good lay between the two extremes. It may be so in this case, and we would advise every farmer, no matter how extensive his pastures, to provide some forage crops which shall supply what the pastures will lack during the months of August and September. Doubtless the farmer of the future, when population shall have increased and land also risen in value, will find soiling not only an economy but a necessity.

ON FARMS.

ESSEX.

From the Report of the Committee.

The Treadwell Farm.—The experiment begun two years ago, for the purpose of showing the comparative value of barn-yard manure, and of two popular commercial fertilizers, has been continued this year. By referring to the reports of the two years previous to this, it will be seen that one acre of land was divided into four equal lots. Number 1 was manured with an amount of Russell Coe's superphosphate, which should equal in cost barn-yard manure at the rate of eight cords to the acre. Lot number 2 was manured with Brighton Abattoir fertilizer, of the same cost. Lot number 3 was manured with barn-yard manure, at the rate of eight cords per acre. Lot number 4 had no manure at all. All the above fertilizers were applied the first year, with nothing else. The product of the lots, for each of the years, is as follows :—

Lot Number 1.

First year,	1,510	pounds of	barley.
Second year,	400	"	hay.
Third year,	130	"	"

Lot Number 2.

First year,	overgrown with charlock		
Second year,	1,200	pounds of	hay.
Third year,	460	"	rowen.
" "	280	"	hay.

Lot Number 3.

First year,	1,890	pounds of	barley.
Second year,	1,300	"	hay.
Third year,	530	"	rowen.
" "	375	"	hay.

Lot Number 4.

First year,	1,310	pounds of	barley.
Second year,	382	"	hay.
Third year,	75	"	"

An experiment with the so-called Stockbridge chemical fertilizer has been conducted on the farm during the last season, upon a piece of thin, plain land that had not been manured for several years,—land that would probably not yield over 20 or 25 bushels of corn per acre, without manure.

The formula for 50 bushels corn per acre, in addition to the natural production without any fertilizer (which cost $27), was applied to a part of the land, and on an adjoining part of the same quality, green barn-yard manure was applied, at the rate of five cords per acre. The part manured with barn-yard manure ripened somewhat earlier, and, when harvested, the stover was somewhat drier than the other part; so that really there was but very little difference in the amount of stover grown upon the different lots. One-quarter acre of that grown with the chemical formula produced 35 bushels of ears, at the rate of 70 bushels shelled corn per acre, and 1,005 pounds stover. The quarter-acre grown upon the barn-yard manure produced 45 bushels ears, at the rate of 90 bushels shelled corn per acre, and 920 pounds of stover.

The total amount of products of the farm the last year, is as follows:—

1 acre of cabbages, . .	yielded	2,522 heads.
1½ acres of carrots, . . .	"	820 bushels.
1 acre 30 rods mangold-wurzels,	"	480 "
2 acres of potatoes, . .	"	119 "
1¼ acres of onions, . . .	"	60 barrels first quality. 28 " small.
5¼ acres of corn, . . .	"	630 bushels ears. 100 " beets. 30 barrels apples. 70 bushels cider apples.
2 acres of Hungarian grass, .	"	5 tons. 10 " corn stover. 4 " corn fodder (cured). 18 " English hay. 19 " meadow hay.

There have been applied to the farm 266 ox-cart loads of barn-yard manure, equal to 99¾ cords; 20 bushels ashes; $80 worth of commercial fertilizers.

Benjamin P. Ware, *Chairman.*

ESSEX.

From the Report of the Committee.

Your Committee have had but one application to examine farms, entered for premium, and this was visited but once (in July) during the year. This farm (if it may be called such) is situated in the western part of Haverhill, and belongs to Mr. Rufus Goodwin, and consists of about ten acres, nearly all of which is under cultivation. In addition to the statement of Mr. Goodwin, which is presented herewith, your Committee desire to say that, in awarding to him the society's second premium of $20, it is not given because of any results attained of a magnitude corresponding with such as have been reached by many farmers in the county, but because his work indicates the possession of a desirable faith in soil cultivation as a remunerative pursuit, and because he has shown, in a comparatively small way, what may be accomplished by intelligent industry, patience, and perseverance in the pursuits of husbandry. Mr. Goodwin is a machinist by trade, and leaving the shop where he was employed at high wages, in 1872, he entered upon the work of clearing his ten acres of land of bushes and rocks, and bringing it into good tilth. The results of his labors for three years abundantly proved that it is *safe* for mechanics and others engaged in industrial labors to throw down their shop tools and take up the "shovel and the hoe" on the land. He has proved that "ten acres is enough" to support a good-sized family, and leave something in the bank each year for "wet days" in life. He has turned his rocky land into what may be called a garden, or what promises to be a garden after a few years more of labor are bestowed upon it. In accomplishing this result, great good is done, inasmuch as it encourages others, who have small means, to turn in the direction of the land for support. If it is proved that five, six or eight hundred dollars a year can be realized from the cultivation of a small homestead in Massachusetts, in Essex County, it surely must attract attention, and lead to the rapid taking up of the tens of thousands of acres of cheap but good lands, which are now entirely neglected. Mr. Goodwin enters largely into the cultivation of fruits and vegetables, which find a ready sale in the near cities of Haverhill and Lawrence. His fruit-trees are young, but very thrifty, and his vines give promise of heavy crops in the coming years. There are many hundreds of acres of good pasture land in the county,—land as good as that upon which Mr. Goodwin is at work,—which can be purchased at about $25 per acre; and to these neglected acres special attention is called. The Chairman of this Committee purchased, a couple of years ago, sixty acres of most excellent land, at a cost of $20 per acre, and this is situated not more than two miles from the city hall in Haverhill, with a population of 15,000. It is this class of lands, of which there is an abundance, which invites the attention of young men and mechanics who do not find constant employment. It is hoped that the farm committees will have in the coming years many "farms" to inspect, which are now comparatively unproductive and valueless, and that Mr. Goodwin's example will be largely followed.

JAS. R. NICHOLS, *Chairman.*

Statement of Rufus Goodwin.

I bought my place, which contains ten acres, in October, 1871. I did not go on it myself till April, 1873. Three acres of the land were under a fair state of cultivation; the remaining seven acres were pasture land, rough and stony, woodland and scattering trees, amounting to 25 cords of wood.

I have cleared the land, sinking and blowing out 200 large stones; have dug and built 175 rods of stone wall, and put in 75 rods of underground drain. I should think I have used 40 cords of manure, 75 bushels of salt, and from 6 to 7 barrels of superphosphate. I have set out 180 pear-trees, 30 apple-trees, 85 peach-trees, 10 quince-trees, 100 gooseberry bushes, 100 currant bushes, 1,000 raspberries, 300 hills rhubarb, 250 asparagus roots, and 300 grape-vines.

In 1873, I sold from my place $412.58 worth of produce. In 1874, $708.94 worth. In 1875, $841.58 worth. In July and August of this year, I have sold $229.42 worth.

IMPROVING WET MEADOWS.

ESSEX.

From the Report of the Committee.

Meadow land, where the mud is deep and thoroughly drained, is liable to suffer from drought like other land, and your Committee were of the opinion that, in some cases, such meadows might be benefited by damming the water at certain seasons of the year, at the outlet of the ditch, and retaining such an amount of water in the ditch as may be necessary to keep the land moist, or to some extent guard against drought.

Meadows require some dressing from the upland in shape of sand, gravel, loam, or something of the kind. Most persons use such material as may be nearest at hand, or can be used with least expense, and if a person is successful, he is apt to think that the material he used is the best, hence there are different opinions on the subject. Sand can be used with considerable less expense than gravel, as it is much easier shovelled. I have been informed by those who have used both sand and gravel on the same meadow, that gravel is decidedly the best. For myself, I have had considerable experience in cultivating meadow land, but never used sand, as I had access to none within a reasonable distance. I should recommend, however, that persons who have access to different material, try the experiment and judge for themselves.

It is an old saying that experience is the best schoolmaster. The writer therefore proposes giving some of his own experience in cultivating meadow land, believing that he has had longer experience than most others, although it may not be so instructive.

Fifty years ago my father had a few acres of meadow land in the central part of his farm, adjoining the road and near his buildings, which he considered of but little value, as it produced but little hay, and that of poor quality. He often said it was an eyesore to him, and that he would gladly give it away, if it could be removed, and his hill land (as he called it) could be moved to take its place. The most of the year it was covered with stagnant water; in winter it was covered with ice, where the boys congregated to play and skate; in spring it was made hideous with the croaking of frogs and paddocks, and in summer the blackbirds built their nests in the tall grass. In the year 1827 (I think it was), my father being feeble, I concluded, with his consent, to take one step at least toward removing the nuisance, which was to dig across the road six or seven feet deep, make a new bridge, and thence into the land of my neighbor, to drain off the water. This work I accomplished, and spread the contents taken from the road on the borders of the meadow, which produced large crops of hay.

The next year, the water having drained off, I dug a ditch across the deepest part of the meadow, and found the greatest depth of mud about three and a half feet, but the outlet across the road was not sufficiently deep to draw the water more than about three feet from the surface. I also dug some ditches in the other direction, as circumstances seemed to require.

In the spring of 1829, my father died, and I came into possession of the farm, by purchase from my brothers and sisters. Now, in regard to the meadow, thus far I had been successful; the stagnant waters had been drawn off, and the noxious reptiles had abandoned it; and the question now was, How can it be improved and made profitable?

I attempted to plough it, but was unsuccessful, as sedge-beds were scattered over the meadow, which, in addition to cranberry-vines, made it impervious to the plough. Again, the question came back, How can I improve the meadow? There was no precedent, to my knowledge, as draining and cultivating meadows were entirely a new thing, and my neighbors were like Job's comforters,—had no faith in my success, and thought it had better go to cranberries, although they were of but little value. The next two years, I did little to the meadow, except draining it more thoroughly, as circumstances seemed to require, by cutting off the cold springs on every side, and spreading the subsoil on the surface, which, with hay-seed being sown, caused good crops of English hay, without manure.

In 1833, I built a new barn, eighty-four by forty feet. The cellar was dug where the old barn had stood for sixty or seventy years. The contents of the cellar, a gravelly loam, were removed into a large heap, mostly by the plough and ox-shovel. The ground was strongly saturated to the depth of four or five feet with the leachings of the manure-heap and the urine from the cattle, where they had been stalled for so long a time.

In the fall, and during the next season, the contents of the barn-cellar were spread on the meadow as top-dressing, on which I sowed herdsgrass and red-top seed. The grass soon sprang up rank and strong, and the next year it produced a good crop of hay. For several years after it produced two large crops per year without more top-dressing.

I think there was more hay produced on that meadow for a series of years, than on any land that I have ever known in the same length of time. I never have known, but once, the amount per acre that it produced at one crop; that must have been some years after I commenced mowing it. That was sold from the field, and went to the stable in the village. Two loads, about three tons, were carried away. I then surveyed the land that produced it, and found it less than one acre. I then computed it, and found the product per acre sixty-seven hundred and sixty-five pounds. I thought at the time that the crop was not so heavy as it had produced some previous years. The mud in the meadow has settled one-half since I first commenced draining it, and it requires much more top-dressing now than it did in the early years of its improvement, to produce a like crop. It rarely suffers from drought, as there is usually water in the main ditch coming from a spring not far distant.

The most of the ditches are kept open. Some of the ditches that I first dug were filled to within about eight inches of the top of the ground with small stones, after making a small culvert at the bottom for the water; then covered the ditch with gravel. The most of the ditches that I have filled with small stones, as above named, have become clogged and filled up, and it has been necessary to dig new ones. I have supposed that muskrats and meadow-moles, in some cases, have had something to do in filling up among the small stones on meadow land, where there is a small depth of mud. On higher land, the woodchucks will sometimes burrow and clog up the ditch.

I have used a large amount of stones for underdraining, and, in some cases, it has been done to good advantage, as the subsoil would pay for throwing out for top-dressing, and the small stones were buried out of sight. I should, however, in most cases, recommend tile for underdraining, where they can be buried sufficiently deep to protect them from frost.

I have extended these remarks far beyond what I intended when I commenced, and will now close.

JOSEPH HOW, *Chairman.*

Statement of J. J. H. Gregory.

The improved wet meadow I enter for your examination is a tract of about a dozen acres, located on the Glover Farm in Marblehead, and bordering on Atlantic Avenue, which extends from Marblehead to Swampscott. The meadow is muck, from two to six feet deep, resting on clay. Previous to reclamation, the tract was of but little value for any purpose; it was wet, rough, and mostly covered with rushes and coarse grasses. About twenty-five years ago there was an attempt made to reclaim a small portion of it, but there then being insufficient drainage, it was a failure. The first step taken was to open a deep ditch of about eight hundred feet in length, which was walled with stone its entire length, at the cost, when finished, of about a dollar a linear foot. The design was that this ditch should serve to drain not only the meadow, but a large tract of low land in the rear of it. The second step was to lay tile or hemlock boards from several springs to the main ditch running through the middle of the meadow. These steps having made the meadow sufficiently dry, the hummocks, hillocks, and tussocks were now attacked with picks and "tormented" with the harrow until the surface was made comparatively smooth. In the course of the work, some of the rougher material we carted off and burned. The meadow, during this and subsequent treatment, was handled in four sections of about equal area, divided by the road running through it, and the main ditch cutting the road at right angles. One of these sections was the first season ploughed and planted to cabbage, and gave an excellent crop. Two of the other sections, in the course of the next two years, were also put under the plough, and yielded, with about the usual quantity of manure, excellent crops of mangold-wurzels and squashes. Potatoes have succeeded well in dry seasons, but in wet seasons are more affected with rot than those grown on common soil. Carrots, when tried in a dry season, are much inclined to grow "prongy." About a quarter of the area, after applying to the surface gravelly loam or sand at the rate of about seventy-one horse-cart loads to the acre, has been planted to onions with excellent success. Heavy crops of hay have been taken from every portion of the meadow, usually two crops each season. In the early handling of this meadow, considerable clay taken from the bottom of the main ditch was spread over the surface.

IMPROVING PASTURE AND WASTE LAND.

ESSEX.

From the Report of the Committee.

On the 28th of July, your Committee visited the farm of Joseph Horton, Ipswich, to examine a piece of land entered for premium.

The Committee would suggest that one item of expense, the carting off of the sods, etc., might have been saved by burning on the land. One of the Committee remarked that he thought the burning might have been omitted, and that the simple turning over of the sods and bushes would have been sufficient to reclaim the land.

This brings in discussion the comparative merits of burning and non-burning; that is, merely ploughing. Where there is a superabundance of vegetable matter, as on peat land and on some clay soil, burning has proved of much advantage. Mr. Horton's land seemed to be somewhat of a clayey nature, though not decidedly clay land, yet a certain admixture of the latter with gravel and loam. We should also judge that it was lacking in humus or vegetable matter.

We think a combination of the two methods mentioned would have been the best; that is, to have burnt the toughest sods and bushes, which would have taken a long time in rotting, and to have left all grass or pliant sods on the land. The process which Mr. Horton pursued is called "paring and burning," and is more common in England than in this country. Mr. Colman, in his "European Agriculture," devotes some attention to this subject. He says: "The process of paring and burning the surface of land has been practised with great, though not always with equal success, in many parts of the country. The objects of it are threefold: first, to reduce the coarse vegetable matter on the surface to a state of decomposition, that it may be supplanted by a more profitable vegetation; the second, to destroy grubs, insects, and the larvæ of insects, which infest the soil and are pernicious to the cultivated crops; and the third, to convert the coarse vegetable matter on the surface into ashes, for the nutriment of the crops which are to follow. This process is not to be confounded with that of burning clay for the purpose of manure, and of rendering the soil friable and pervious to the roots of plants." The mode of burning described is the same as practised by Mr. Horton,--that of slow, mouldering fires,—but the burning itself seems to have taken place on the land.

Mr. Colman quotes the following, which certainly seems a remarkable statement: "An acre of land from which the turf was taken in the common mode of paring and burning, appeared to have produced an average of 2,060 bushels of ashes, which, at their mean weight of sixty-five pounds to a bushel, when dry, would give 172,900 pounds, or rather more than seventy-seven tons per acre."

We hardly know how to estimate the quantity of ashes produced on Mr. Horton's land from the information given. He says, twenty loads. Without knowing the size of the loads, we shall estimate that each load contained fifty bushels, which would give a total of one thousand bushels, and at twenty-five cents a bushel, would be worth $250.

Mr. Colman also goes on to state what has a very important bearing on the subject, that "it has been said that the destruction of vegetable matter in the soil must necessarily impoverish it; and that it would be much better to bury this vegetable matter, where, by a slow decomposition, it might serve to afford nutriment to the crops to be cultivated. There are, in the first place, some mechanical difficulties in the case. Where a piece of heath land, covered with coarse grasses and low bushes of furze or fern, is ploughed, it is extremely difficult, even by the most severe process of pressing or rolling, to make it lie flat, and so consolidate it that it can be cultivated to advantage. This is stated to have been the fact, on an extensive heath in Surrey, where cultivation under the practice of paring and burning succeeded well, but very ill where the land was only turned over without paring and burning."

"There are certainly strong reasons, in such cases, for paring and burning fields of this description; but they do not apply to those lands where the vegetable matter is of a different description, and would, by being covered over, be speedily brought into a state of decomposition. In the process of burning, it is evident that none of the earthy or mineral constituents, or what are called *inorganic* portions of the soil, are consumed. But all the vegetable matter, with the exception of that portion which has become charred in the process, is destroyed."

"The humus of the soil serves to render it more friable; it absorbs moisture from the atmosphere, and it retains heat, and, in these respects, if in no other, contributes to vegetation. In dissipating this matter, then, by burning, we must look for some compensation in the ashes which are produced, or in the mechanical effects which this burning operates upon the soil. The ashes themselves are powerful absorbents and retainers of moisture, and they answer a valuable purpose in the disintegration, or loosening, of the soil. They certainly, in many cases, operate as an efficient manure."

"The expediency of paring and burning land must, as I have remarked, depend upon the nature of the soil which is to be subjected to the process. On light, sandy, or gravelly soils, where the vegetation is thin and sparse, it is strongly objectionable."

After having given Mr. Colman's instructive analysis of the subject, we shall only add that we would suggest to Mr. Horton that the ploughing under of several green crops, like clover, would be likely to restore any loss of vegetable matter which may have been incurred in the process of burning.

J. D. W. French, *Chairman.*

Statement of Joseph Horton.

As the land that I have offered for the society's premium, having been inspected by you, received the same treatment as a parcel offered last year, I quote in full from the "Transactions" of 1875, my method in detail of treating such lands:—

"STATEMENT.

"The land upon which I operated was about two and one-half acres of old pasture. The surface was raised into ridges and hillocks, and, for the most part, covered with bushes. Treatment: by ploughing, I levelled the ridges, tore up the bushes, getting out what roots I could. I then carted the whole into a pile, and started a fire, which I kept going until all were consumed. The field was then ploughed again, and seeded to grass. Twenty cart-loads of ashes—the amount obtained from the fire—being applied for dressing. But, as a great part of this dressing was blown off by the wind, I afterwards applied four cords of stable manure as a substitute.

"This method has decided merit over all others that I have tried, as it thoroughly, and at once, clears the land of all noxious growths, works the soil, leaves it in such a condition that it can be treated readily, and in a first-class manner, and as it furnishes its own manure, comparatively cheap. In regard to the chemical properties, or value of these ashes, I can give no information. I simply know that the land upon which they were used does well, and, as yet, shows no sign of running out.

Expense of Improvement.

Ploughing and clearing,	$20 00
" and preparing for seed,	20 00
Seed,	3 00
Four cords of manure,	28 00
Total,	$71 00
Income the first year, 4½ tons of hay, at $25 per ton,	$112 50
" beyond expense,	41 50"

OBSERVATIONS ON THE ABOVE STATEMENT AND REPORT.

The reading of the above report gave rise to considerable discussion at a meeting of the trustees of the Society, when reports of committees were under consideration, and I was requested to append to the report some remarks.

I desire to call attention briefly, first, to the written statement of Mr. Horton, and second, to the observations of the Committee, and the extract presented from Mr. Colman's "European Agriculture." The points in Mr. Horton's statement which seem extraordinary, relate not so much to the simple method adopted in clearing his land, as to the alleged ash results obtained and their assumed fertilizing influence upon the field. To obtain "twenty cart-loads of ashes from two and one-half acres of pasture land," it would be necessary for Mr. Horton to cut down in bushes, and dig up in roots, and haul to his "pile," at least *five hundred* "cart-loads" of the material. This is apparent from the fact that such woods contain only about two and one-half per cent. of ash constituents. A "cart-load" of ashes may be assumed to be forty bushels, weighing forty pounds to the bushel; this gives in weight to the load sixteen hundred pounds, and to the twenty loads, thirty-two thousand pounds. It seems utterly impossible to obtain thirty-two thousand pounds of ashes from bushes and roots taken from "two and one-half acres of old pasture land"; and, if obtained, the dressing would be enormous. Another inexplicable point in this statement is, How could Mr. Horton plough the land, cut down the crop of bushes, dig up the roots, and cart away the immense amount of material, at a cost of *only twenty dollars?* As a "great part of the dressing (ashes) was blown off by the wind," the fertility of the field is presumably due to the manure applied. The loss of twenty "cart-loads" of dry wood-ashes, is a serious one, the cash value being, upon the estimate above given, at thirty cents a bushel, $240,—more than twice the value of the hay crop secured.

It only need be said, that it requires but a glance at this statement to learn that it was prepared in a hasty manner, and without due consideration. There is, probably, no intention of inaccuracy of statement, and these strictures are kindly made, with the view of securing in the future more exact and reliable accounts of the farm labors and farm improvements. The estimates here made differ from those of the Committee, in item, cost, etc., but not essentially in general result.

As regards the astonishing yield of ashes from an acre of land, alluded to by Mr. Colman, and quoted by the Committee, it may be said that that ash result came from the burning of *turf*, and the ash was composed of at least *ninety per cent. of silica or sand*, and therefore it was comparatively valueless. Pure *peat ashes*, I have found to give, upon analysis, eighty-one per cent. of silica, which accounts for their small value as plant-food. *Turf* is sand, with a small amount of vegetable matter diffused through it, and when it is burned, the sand remains behind in a heap, *resembling* pure ashes. Mr. Horton's experiment is different; he alleges that his ashes were the result of the burning of bushes and roots. The "heath" and peat lands of England and Ireland are very different from our waste lands, and the methods of treatment for recovery cannot well be the same.

The treatment pursued by Mr. Horton is essentially that which was adopted by our forefathers one and two hundred years ago. A rare old book may be found in the library of the Essex Agricultural Society, entitled, "Essays upon Field Husbandry in New England, by Jared Elliot, A. M.," published in 1760, in which a statement is made, on page 6, of experiments in reclaiming waste land, which in methods adopted closely resemble those of Mr. Horton. It is to be regretted that we have so little which is new to present upon so important a branch of husbandry.

JAS. R. NICHOLS.

HAMPDEN.

Statement of H. M. Sessions, South Wilbraham.

The success that has attended the experiments in draining on different sections of my farm, can be better understood by actual observation on the premises, than by any description that can be given on paper. There are nine separate lots, or sections of lots, that have been drained at different times; running back over a period of twenty-six years. A map has been drawn of the different lots drained, giving a view of the exact locality of each drain, both open and covered. The plan first adopted is essentially the same as that now practised, with such improvements as have been suggested by actual trial. Underdrains of stone have been most generally used; though open drains are used in some sections, for want of time to fill them; and in other sections they have been used in preference to covered drains, to carry off the accumulated surface-water, and to receive that from the underdrains. The construction of these underdrains varies. A few have been laid in the form of a culvert, but generally small stones have been tipped in promiscuously from the cart, and levelled by throwing the largest to the bottom. The ditches have been dug from two to three feet wide at the top, and from one to two feet at the bottom, and two and a half to three feet deep, the width and depth varying according to the nature of the soil and the undulations of the surface, an even and gradual descent always proving the most effectual. Where the soil was soft and loose, as in sand or muck, the ditches were dug three feet wide at the top, and two feet at the bottom. If dug narrower, the mud and sand would work in, and soon stop the water. In hard-pan, two feet wide at the top, and one foot at the bottom, is all that is necessary. These ditches were filled with two feet of stone and one foot of earth. In a few cases, litter or swamp hay has been used to cover the stones before the dirt was put on, but generally it was filled in with a common road-scraper, without any covering.

Drains constructed in this way in 1849, are to-day as effectual as when first made. The upper end of blind ditches should never be left open, nor should there be any other opening to receive running streams, or periodical surface-water; for, if so, they will soon fill with sediment and be rendered of no account. In only three instances have these drains failed. The first was where the fall was so slight, that in high water they were clogged by sediment setting back from the brook. The second was where either the frost or meadow moles, or both, caused leaks in the sides of the ditch, where located on the side-hill, allowing the water to follow their tracks instead of the line of the ditch. This has occurred only where the fall was made very slight, in order to carry the water high up on the dry land for the purpose of irrigating as large an area as possible. The third was where too large stones were used in a narrow ditch, and it soon clogged.

Lot No. 1 is a rock-maple swamp of about ten acres, used for a pasture and for mowing litter. The attention of the Committee is more particularly called to this lot, for an opportunity to see the immediate effect of draining. In this lot there are one hundred and sixty-two rods of open ditches, and in 1875 twenty-seven rods of open drains were constructed, and three acres thoroughly reclaimed and seeded with grass for permanent mowing. One acre of the above was stocked with buckwheat, half-acre with turnips, the rest with grass alone. The amount of grass-seed sown per acre was as follows: two pecks herdsgrass, one peck northern red-top, half-peck southern red top, half-peck of fowl-meadow, with several barrels of chaff saved from the cattle's mangers, and sweepings of the feeding floor, in addition.

The yield of grass on this reclaimed lot, in 1876, was from two to three tons per acre of the very best quality of hay.

During the summer of 1876, twenty-two rods of underdrains were constructed on this lot, and twenty-four rods of ditches dug. About three acres additional have been reclaimed and seeded; a part with buckwheat, and a part with grass-seed alone, using orchard-grass and Alsike clover in addition to the varieties sown last year.

Lot No. 2 is a section of two acres, adjoining the maple swamp on the north, and has fifty-three rods of covered and thirty-nine rods of open drains. It was cultivated two years with hoed crops, and seeded with oats, and has now been in mowing eighteen years, the underdrains as effectually carrying off the water as when first constructed.

Lot No. 3, on the east bank of the brook, was drained in 1855; eight rods of open ditches and forty-two rods of underdrains were laid on one and a half acres; the land planted with potatoes, and the next year seeded to grass with millet for mowing. One of these ditches only has failed, having been dug too narrow and filled with too large stones.

Lot No. 4, a lot on the west bank of the brook, contains one and a quarter acres. In 1859, seventy-two and a half rods of underdrains and four rods of open drains were made. This lot was thoroughly ploughed and planted with potatoes; the next year heavily manured and seeded to grass with buckwheat.

Large crops of grass have been cut from this lot ever since, with only two or three top-dressings of manure during the time, the lot receiving the wash from the upland above. A number of these ditches have failed from the setting back of the brook.

Lot No. 5 contains about three-fourths of an acre on the side-hill adjoining the last lot. Thirty-seven and a half rods of underdrains were laid in 1862; the land planted with potatoes two years and heavily manured each year, and the next year stocked to grass with oats, for permanent mowing. Two crops have been cut from this lot each year since. Most of these drains are doing good service to-day.

Lot No. 6 is a swale in the centre of the barn lot, of about three-fourths of an acre. Forty rods of underdrains were constructed in 1849 and 1850. The land was never ploughed, but levelled by bogging. With an annual top-dressing, two heavy crops of grass have been cut each year since. In 1876, twenty-one and a half rods of underdraining were laid on this lot to remedy the failure caused by meadow moles, at the following expense:—

Digging ditch, at 25 cents per rod, ...	$5 37
Drawing 45 loads of stone, ...	12 50
Filling ditch with road-scraper, ...	4 00
Total, ...	$21 87

Lot No. 7 is a section north of the last, in the same lot, of half an acre. Twenty-five rods of underdrains were laid in 1851, with the same treatment and results as in lot No. 6. These drains in No. 7 are in as perfect condition, apparently, as when first constructed.

The water from the drains in the last two lots is conducted in open ditches to irrigate the adjoining dry land.

Lot No. 8 has seventy-three and a half rods of covered drains and forty and a half rods of open drains, made during the years of 1858 and 1860, and are working well. The lot was cultivated with corn and potatoes, thoroughly enriched with manure and seeded with grass, and set with apple-trees for an orchard. The trees have done well, especially near the underdrains, and the lot has produced an extra quality of hay, with an occasional top-dressing of manure.

Lot No. 9 is a meadow of about four acres further up on the brook, and is annually overflowed. It was never ploughed, although it has been mowed ever since the first settler occupied the farm.

In 1875, half an acre of this lot was ploughed, highly manured, and reseeded with herdsgrass, redtop, Kentucky blue-grass, and fowl-meadow.

Forty rods of this lot were seeded the middle of August, and the remainder about the middle of September, it being too wet to seed with the first lot.

July 7, 1876, the 40 rods first seeded were mowed, and November 27, it was sold to J. S. Carr, of Springfield, for $21 per ton. It weighed 1,550 pounds, and amounted to $16.27, or at the rate of 3 1/10 tons and $65 per acre.

During the past summer (1876), about two acres of this meadow have been ploughed and reseeded.

Thirty-five rods of underdrains have been laid, and 34¼ rods of ditches dug, but not covered.

The plough used was Whittemore & Belcher's side-hill plough, No. 1,000, with meadow point, the wings of which were ground twice a day in order to cut the bog-grass roots.

During the time above named, 298 rods of underdrains have been constructed, and 249¼ rods of open drains have been dug. In 1876, 79 rods of covered and 58½ rods of open drains have been made, making 377 covered and 307¾ open drains, or 684¾ in all.

FRANKLIN.

Statement of Alonzo Graves of Greenfield.

The piece of land I have entered for premium contains four and three-fourths acres. In 1866 two-fifths of it was covered with a young growth of wood, with occasionally an old forest tree; the remaining three-fifths with large clumps of willows; the whole was very uneven and extremely wet, pond-holes standing on part of it the whole of every year. In the spring of 1866, I cut all the wood, and dug up all the willows; I mowed the brush and coarse grass every summer after that until the spring of 1873, when I dug and pried up all the stumps and ploughed with one yoke of cattle the two-fifths; in September following harrowed, levelled, ditched, manured and sowed to grass-seed, herdsgrass, clover and redtop. The three-fifths my children called the checkerberry lot, as these and blueberries covered nearly the whole of it. This, in the fall of 1874, I ditched, ploughed, harrowed, levelled, and manured and then harrowed again; then sowed herdsgrass and redtop; the next spring, clover on the snow. I manured at the rate of fourteen cart-loads to the acre, which was taken from my barn cellar, where hogs had worked on it. The east and north side of this piece is bordered by an open ditch, thirty rods of which was an old one I reopened in 1866, and I dug thirty rods more new; also, in 1873–74, I put in fifty rods of underground ditch, running in various directions, to tap the quag-holes. This ditch was dug fifteen inches wide, about two and one-half feet deep; it was constructed by putting two dead white-pine poles, about four inches in diameter, at the bottom, and covering, cross-wise, with inch boards, made from chestnut logs sawed fifteen inches long and split; I filled it by throwing in weeds, brush, bark, etc., to break joints, then covered with earth. This drained the land to perfect satisfaction.

There were two pond-holes that had such a depth of muck that it was impossible to drive over it, or do anything with it, until we had drawn on three or four inches of clay; then we seeded top of the clay. The result was we cut the stoutest grass there.

I estimate the cost of improvement to be,—

Digging stumps,	$20 00
Ditching,	60 00
Ploughing,	20 00
Harrowing,	20 00
Levelling,	20 00
Manure,	100 00
Drawing clay,	15 00
Grass-seed,	15 00
Total,	$270 00

The return was two-fifths mowed three years, and three-fifths two years, which I estimate to have produced twenty-six tons of hay, at $15 per ton, standing $390. Net profit, $120.

DEERFIELD VALLEY.

Statement of E. C. Hawks of Charlemont.

The reclaimed swamp land entered by me, is a part of a marsh of several acres lying south of my house, near the foot of the hill, on the road from Charlemont to East Hawley. Fifty years ago, this land was covered with timber, mostly black ash, with a few huge pines. There was much fallen timber imbedded in the muck, which might have been there for centuries. About five years later, this portion was cleared of these obstructions, with the exception of a few large pine stumps. An open ditch was dug along the north and east sides; two ditches were also opened across the central portion, and intersecting with the ditch on the north side at right angles. For many years these open ditches have proved very ineffectual, that on the east side being nearly filled up, and the land so saturated with water as to be of very little use for farming purposes. The soil is a black muck, from two to seven feet in depth, with a subsoil of clay and sand. In the autumn of 1872, I commenced to reclaim this portion of the swamp, which was yielding only about one-half ton per acre of water-grass, fine brakes and vines, which was used for bedding. At that time a portion of the ground was so soft that I could not drive upon it with my team. The old ditch, on the north and east sides, was settled to a depth of two feet, and a stone drain laid, on plank covered with stone; two lateral drains were cut, of about five rods each, and laid with two-inch horseshoe tile. This tile was laid upon boards, the muck being so soft that the tile would not keep its place. The piece was turned over with the plough, except the softer portion, which was done with the spade. It was then levelled, and received a dressing of ten loads of chip-dirt, and seeded to timothy. In the spring of 1874, I found much water standing on the surface, in the vicinity of the tile drain. On examination I found the tile had been displaced by cattle passing over it while the ground was soft. I then caused the tile drains to be relaid, placing a board above the tile, as well as below, since which time it has given me no trouble.

The cost of 17 rods of stone drain, ...	$17 00
" of 10 rods of tile drain, ...	7 00
Ploughing, fitting and seeding, ...	7 00
Grass-seed, ...	1 00
Ten loads of chip-dirt, ...	5 00
Relaying tile, ...	1 00
Total, ...	$38 00

Hay of 1874,	1,730 pounds,	2,760 pounds.
Rowen, "	1,030 "	
Hay of 1875,	2,630 "	4,580 "
Rowen, "	1,950 "	
Hay of 1876,	1,950 "	2,100 "
No rowen, on account of drought, 1876,		
Total,		9,440 pounds.
At $16 per ton, this would amount to		$75 52

The crop can now be secured by machinery at an annual cost of about $1.50.

BRISTOL.

Statement of Peter C. Thayer of Taunton.

The half-acre of grass I enter for the Society's premium has been in grass ten years, was reclaimed swamp, ploughed after roots had been torn out about six inches deep, and a coat of sand about two inches thick, with about six cords of manure and half a ton of bone to the acre, and sowed to herdsgrass, twelve quarts to the acre, and harrowed in.

I have given it a top-dressing every year since, of about six cords of stable and hog manure per acre, the cattle having been bedded with sand, and four years ago I gave it a second dressing of half a ton of bone and twenty bushels of unleached ashes per acre. Last March I gave it a top-dressing of about six cords of stable and hog manure per acre, and the first of May I gave it a light dressing of night-soil.

My first crop of hay was cut and taken away by the committee on crops June 21; second crop cut July 24; third crop cut September 12; each crop was taken away and dried and weighed by the committee.

The committee selected one rod as a sample of the half-acre, and after taking away the first cutting told me that the rod they had selected should be the sample rod for the season, and told me to do anything to the rod I pleased, and requested me to try and see how much I could raise on the rod.

The day the first crop was cut I gave the sample rod a top-dressing of fine manure, and about sixty gallons of water, and I continued to water it through the season, using about eighty gallons of water per week.

I gave the rod between June 21 and September 10, two days before the last (the third) crop was cut, fifteen pounds of guano dissolved, half a bushel hen manure dissolved, one peck of soot dissolved, two pounds of saltpetre, four quarts of air-slacked lime, four quarts of plaster and one quart of ammonia.

The hen manure and guano were dissolved together, and were used once a week, with a large amount of water; the saltpetre and ammonia were used each once a week. The soot, lime and plaster were all used at the same time, and but once, two days after the first crop was cut.

The committee reported to me that the—

First crop (after being dried to their satisfaction) weighed,	47½ pounds.
Second crop weighed (dry), ...	45¼ "
Third " " "	57 "
Total, ...	149¾ pounds.

The above is the result of the sample rod, and I have no means of telling the exact amount grown on the whole half-acre. At the first cutting the rod was a fair sample of the half-acre; the second and third cuttings were not, but were forced for the purpose of seeing what amount could be raised from a rod. The half-acre was not surveyed, because there was an acre so nearly the same yield that the committee did not deem it necessary.

FRUIT-CULTURE.

ESSEX.

From the Report of the Committee.

It was almost impossible that full justice to all should be done, with five hundred and fifty-eight plates of apples of such good quality and of so many different varieties, scattered, as they were, among pears and other fruits, over six long tables, without regard to kinds. Is it not too much to expect, and too much to impose upon this or any committee, in the limited time assigned them? We at least think so, and as Chairman of this Committee, this year's experience, added to the experience of last year as chairman of committee on grapes, peaches and assorted fruits, causes me here and now to protest against the manner of arranging and displaying the fruit upon the tables of the Society, causing such laborious and unsatisfactory work for your committees, who believe it a necessity that a radical reform should be made in this direction, if it expects faithful service from its committees, and justice dealt out to its exhibitors.

We therefore would recommend, what has already been adopted in some societies, the plan of having stands set upon the tables, labelled with the variety or kind of fruit there exhibited, with rods to lay across the table to separate each variety. By having *all* of each variety by themselves so labelled, the kind of fruit and variety can be easily found, and when found the best can be easily selected, as all the plates of that variety are together for comparison; while, as the tables are now arranged, it is simply impossible for any committee on fruits to perform their duty in the time allotted for it, and do justice to all the exhibitors; the labor being so tiresome and tedious that it is a wonder that men are found interested enough to undertake it. We consider that an exhibitor obliged to exhibit fruit in a round dish, or emptied loose upon the table, is not treated with equal fairness with those using the regular plates of the Society; and therefore the Society should provide plates enough of its own for all to use, and we would recommend that it do so before another season. We also think more notice ought to be taken by the trustees of the reports of their committees, and where recommendations are made in them, they should be noticed and acted upon, even if not adopted. Where such notice is not taken, you add another discouragement to a faithful committee.

About apples and their culture, your Committee, through their Chairman, tried to get the experience of every exhibitor, that their statements might be condensed and put in tabular form, that comparisons could be made more readily, and the information desired found separated like grain from its chaff; but the responses made to the questions, *asked of all*, have been so few that these statements are appended to this Report for its readers to do their own sifting, which will be found to recommend as the best and most profitable apples for raising in this county, the Baldwin, Hubbardston Nonsuch, Gravenstein, Rhode Island Greening, Danvers Winter Sweet, Red Astrachan, Hunt's Russet, Roxbury Russet, Porter, and Williams Favorite.

Coal ashes have been tried on their apple-trees, by some, with very satisfactory results. The reports on peaches last year, showed that coal ashes around peach-trees had proved beneficial. If more experiments were made with coal ashes, we should find more virtue in them for tree and plant life than they have been supposed to contain. Salt has been used in manure with beneficial results to the trees.

We are led to think that pine-trees are a great preventive of the ravages of the canker and currant worm, as some orchards with plenty of pines near them are not visited by them. Will our apple-growers notice this, and if such is generally the case, make it known to our secretary, that experiments may be made with pine boughs as a preventive. Printers' ink is universally considered the best protector yet known for apple-trees. Mathews' protector has proved itself an injury to the trees, in one locality at least, trees having been badly injured by their use.

Your Committee found, among the others exhibited, a most excellent apple, very large and handsome, crisp and juicy, with a very fine flavor; it was entirely unknown among the fruit-growers present, who, with the Committee, tested its eating qualities. The name given to it by the exhibitor being considered incorrect, your Committee unanimously decided to name it for one so long identified with and loved by our Society; we therefore gave it the name of the Sutton apple, and as such it will be extensively cultivated for its worth.

The exhibit of apples by our Society, in size and good looks, was worthy a place second to none we saw at the Centennial Exhibition, though the *average* size of some may have been larger from the States in the prolific West; yet, in beauty and keeping qualities, our apples beat them. Canada made a fine show of apples, and in plums she excelled all competitors, showing that *we* may hope yet to regain here this delicious fruit, ripening between the cherry and the apple, which has been so profitable in this county in the past, and which our Society should offer special inducements to promote the cultivation of, that eventually a remedy for the curculio and black knot can be found.

A variety of opinion prevails in regard to the expediency and benefit of root-pruning. We have found in ploughing an old orchard, breaking off roots of various sizes, that the trees since have started with fresh vigor in growth, producing much larger apples, with less tendency to drop than before.

We have also found an excellent preventive from the ravages of ground mice on young trees, to be a couple of shovelfuls of fresh cow manure put around the butt of the tree late in the season.

We were in hopes to draw out from the experience of so many different fruit-growers individual experiments and results, which would in the aggregate furnish information to our Society of the most valuable kind; but the exhibitors were not so interested in furnishing it as your Committee in seeking it, although we believe it one of the requirements of the Society. However, enough valuable information has been furnished to interest and instruct others, and we trust that hereafter exhibitors, especially those receiving awards, will feel it a pleasant duty to forward to the chairman of the

Committee, soon after the close of the annual exhibition, an unsolicited statement in regard to their exhibits, whether it be fruits or anything else, with items of their own experience which may benefit others, thus adding to the stock of knowledge, for the procurement and dissemination of which our Society was formed.

David W. Low, *Chairman.*

Statement of Mrs. Lucy J. Pratt of Danvers Centre.

Apples.—Our orchard is small, only about thirty-four apple-trees, with some fourteen varieties. The soil is heavy and black. The trees are all in a mowing field, and no particular enriching is used, except an occasional top-dressing of good stable manure; no digging round the roots or other means are used,—they are simply let alone.

Some half-dozen of the trees are quite old, but the remainder are young, very fair-shaped, flourish well, and bear well. Of the starting of the orchard I cannot say, except that no particular pains were taken with it above the average.

The pill we prepare for caterpillars is simply a bristle brush on a pole,—give it a few good twists, and step on them.

The way we doctor canker-worms is much the same as everywhere, but ours may differ in some respects. We use for protectors, instead of the tarred paper, enamel cloth, such as wagon-tops are made of; then spread on the printing ink as often as it requires, being sure, however, to keep it moist all the time. Our neighbors use the paper, and are obliged to renew it every year, while our enamel cloth will last two years, and perhaps longer. The cost of course is more in the beginning, but we think will be cheaper in the end. I think no others have used this cloth in our neighborhood, except on my father's and our own trees. But little pruning is done, enough to keep them in pretty good order and shape. The wormy fruit we keep picked up, and it is used for animals.

To the question of the five varieties considered the most profitable, with my limited knowledge I would say, for early, the Astrachan would lead. It is well and favorably known,—

good cooking and good-looking, as well as good selling, but rather short-lived. Of early fall, the Gravenstein is our particular favorite, being of handsome color as well as a beautiful eating apple, and for cooking seems to us to be unsurpassed. We had some thirty-seven bushels from our little orchard this year, and they would sell in market when others would hardly get a passing glance. They are very free bearers, and we think they are *the* fall apple.

The Hubbardston is a fine large apple, also a very free bearer. What it lacks in richness of color it makes up in size; finds a ready market and cooks well. This year ours have been uncommonly good. Williams Favorite is as bright an apple as one would wish to see, and is good to eat, too, but needs to be eaten raw. Danvers Sweets are, according to our judgment, good as any, but sweet apples never seem to be very profitable. People do not seem to have any idea what a variety of uses can be made of them in cooking.

Of winter apples, we are still old-fashioned enough to cling to the Baldwin, which seems to me to be an apple that one does not tire of as we do of many of the newer sorts.

To speak lastly of a good winter eating apple, none is in such favor in our immediate vicinity as the Hunt Russet,—a smallish russet apple, smooth and fair, and very uniform in size. It will keep *good* until apples come in the summer. This kind cannot be too highly spoken of. It sells as readily as bakers' turnovers at a cattle show,—which is saying a good deal for an *apple*. Of the ten varieties, I should say, Astrachans, Williams Favorites, Gravensteins, Hubbardstons, Danvers Sweets, Fall Harveys, Sweet Baldwins, Baldwins, Roxbury Russets, Hunt Russets, Greenings.

These seem to us to be the leading kinds, but there are hosts of others with which I am not familiar, that may be better than many of those I have spoken of; but I think I was only asked to tell what I knew, so I think my duty is done.

Statement of Francis S. Lovett, of Beverly.

I have sixty-five trees. Fifty are young, on light land, with sand or gravelly subsoil. Fifteen old trees are on a rocky piece of land. I have thirteen kinds; have not manured the old trees, but the young orchard I have ploughed, manured and planted, as much as possible. I came here about ten years ago, found the trees in grass land, growing but very little. I ploughed it up, and have kept it ploughed up since then. I cannot tell how the orchard was started. The trees have grown finely, and bear well, an extra quality of apple, mostly Baldwins. I have not been troubled by canker-worms, but have a few borers in old trees, and have had an extra quantity of caterpillars this year, especially this fall. I think the best way to get rid of them is to kill them, morning and evening, when in their web, as soon as they make their appearance on the tree. I do not believe in too close pruning; would prune about the first of June, as the wounds heal better at that time. My wormy apples are fed to cows and pigs; when the apples are fit they are made into cider.

I should say Early Bough, Red Astrachan, Hubbardston Nonsuch, Gravenstein, Hurlburt, Minister, Ladies' Sweeting, Baldwin, Northern Spy, Roxbury Russet and Hunt Russet, are the most profitable in this county. The best for the table are Early Bough, Williams Favorite, Hubbardston Nonsuch, Gravenstein and Minister. Early Bough is one of the best sweet apples; a good, constant bearer. Williams Favorite is a splendid apple, but requires strong soil and high culture to perfect the fruit; it is very apt to be wormy in some locations; it is a good bearer. Hubbardston is a fine apple, and an extra good bearer (with me bears every year); keeps well; I have seen apples of this variety as late as March. Gravenstein is a very fine apple, good bearer, will sell as well or better than most any other variety. Minister is a thin-skinned, tender, acid apple, very nice when well ripened; an enormous bearer; requires very careful handling; will not do to "hand-pick" off the grass, as a great many have done this year. The Northern Spy and Roxbury Russet are both open to objections; both require a strong, rich soil to get fine fruit. A more juicy, better flavored apple than the Northern Spy cannot be found; good for cooking as soon as it is large enough, and will keep until June or July, with a good, fresh, brisk flavor. Roxbury Russet is apt to be small and wormy on old trees; still it is so well known that there is no trouble to sell good ones at any time. Hunt Russet is a great bearer; a fine, tender apple, objected to by some as a market apple on account of its size; a fine apple to keep.

Statement of Peter Wait of Danvers.

I have about forty apple-trees and twenty or more kinds of apples. My soil is mostly gravelly, with a strong clay subsoil. In regard to enriching, I think one of the best fertilizers is glue-dross. I have used much tan-yard waste, such as old tan, lime, and hair, but to quicken and warm up my trees, I use night manure. I apply it in the fall as a top-dressing.

My trees are mostly thirty years old, and upwards. In regard to planting, I made use of no science, but simply dug a hole sufficient to receive the roots, without manure or any previous preparation. My treatment ever since has been top-dressing, keeping them cleaned and well pruned. The borers have been quite a trouble to me. I consider them the most destructive enemy to the apple-trees we have to contend with. The best treatment for them is a free use of soap about the time they hatch.

After using Mathews' protector for two or three seasons, I have resorted again to printers' ink for the destruction of the canker-worms. The caterpillar with me has almost become extinct. Cluster-worms and fall caterpillars are easy to destroy.

I prune my trees any time when convenient, except large limbs, which I cut generally in the fall or early winter. I keep my trees well pruned, taking off all useless twigs and spurs. Wormy fruit I collect some three or four times in the course of the season. I sell the best for what I can get, and what is not sold or given away to those that have none, is thrown into the hogpen.

As the best apples for cultivation, all things considered, I give the following: Baldwin, Rhode Island Greening, Danvers Sweet, Seaver Sweet, Fall Harvey, Sweet Baldwin, Hunt Russet, Roxbury Russet, Northern Spy, Garden Apple, Hubbardston Nonsuch, Ben Apple, Gravenstein and Porter.

For table use, I give in order as they come: Early

Harvest, Red Astrachan, Porter, Gravenstein, Fall Harvey, Minister, Hubbardston, Baldwin, Greening and Hunt Russet.

I will not speak of the peculiarities of any except the Garden Apple. This apple seems to be but little known, yet I knew it when a boy, but, like the Hunt Russet, it was kept in obscurity. I believe I was the first to introduce the Hunt Russet into the nursery. In its season the Garden Apple is the best for culinary purposes, growing very large and fair, and a great bearer. They come early into use, and last until Thanksgiving. It is highly worthy of cultivation, and should be encouraged by our Society.

Statement of George W. Taylor of West Peabody.

I have some three hundred apple-trees on my premises, of which there are about thirty varieties. My soil is a deep loam, rather rocky, with many large bowlders. The subsoil is a gravelly loam, which is underlaid by a pan of clay gravel that is almost as hard as the stone itself. A smart blow with the pick cannot penetrate it more than an inch or so. My land is not very apt to suffer much from drought. I have not been in the habit of applying any special manures to my orchard or among the isolated trees that are scattered over my farm.

When I plough up the ground among the trees, I usually plant some crop, such as corn, corn-fodder or potatoes, for a year or two, then lay it down to grass. All the manure my apple-trees ever get is applied when my land is under the plough. Before leaving this portion of the subject, I will add my word in favor of mulching among trees. Too much, in my opinion, cannot be said in favor of the practice, and no work in the orchard will repay the owner so large a percentage on time and expense. Any old rubbish that is always accumulating about a farm will answer, yet we prefer old hay or weeds. Any of the following substances might be employed for this purpose: potato-vines, cornstalks, wood-wax or old tan, and I have known the pomace from the cider-press to succeed admirably. One of my neighbors has used this for several years as a mulch, and I have noticed that his apple crop has been much improved, both as to size and quantity, where he liberally mulched his trees. I knew an instance where the ground under quite a large apple-tree was covered over with slabs for several years, and it produced enormous crops of fruit much larger and fairer than that produced before the slabs were piled under the tree.

There are trees on my place, ranging from those but a few years set up to the old hoary-head that must have stood the wear of time for a century at least. There is a young orchard of about seventy trees, that was set out in the years from 1855 to 1860. These trees were purchased from the proprietor of a nursery adjoining the lot upon which my orchard stands. This orchard has been cropped ever since being set out, either with hoed crops or grass.

I have never been bothered much with the borer or caterpillar. Either can easily be gotten rid of, if proper care is taken at the proper time. To prevent the borer, it is of the utmost importance to keep all the grass and weeds removed from near the trunk of the trees, thereby destroying all chance for a safe harbor for the embryo borer. Caterpillars can be destroyed by two or three thorough cleanings of the trees. But canker-worms are worse than all the other enemies of the apple combined. No remedy that is within the reach of farmers has as yet been discovered that will effectually keep them down. The patent tree-protectors are much too costly, and require too much tending to ever become of much benefit to the fruit-grower. They may do well in small private gardens, where the owner has an eye on them several times a day. Tar, or printers' ink, applied to the trunk of the tree, is the cheapest, most effectual and surest method that can be adopted to rid the apple orchard of the scourge. I am of opinion that it would be of decided advantage to all concerned if one-half at least of all our apple-trees were cut down and removed. I believe that an apple-tree lasts and bears fruit with any profit to the owner for only one generation. Even if they do live along and produce, it is only as an unsightly and hollow-hearted nuisance, where grubs and vermin of all kinds seek a home to breed their kind, and from which to sally forth and attack the young orchards. Better far it is to remove the old, worn-out trees, and take better care of the young and vigorous.

As to pruning, a little each year is the best; thereby avoiding the necessity of removing large branches, which leave wounds that it takes years to heal over. As to time, let the grower be guided by his own inclinations; it is better at any time of year than not to do it at all; still, I am satisfied that the last of May or early in June is a good time to perform the operation. This, however, has a serious objection; it is the season when farmers are most busy, and can ill afford the time to attend to it.

Soon after the leaves of the blossoms have fallen, the fruit commences to form and set on the tree. One after another of the embryo fruit becomes crowded out and falls to the ground; this is continued from the time when the fruit first commences to grow till the last apple is plucked from the tree. A great deal of this imperfect fruit is fit for no purpose whatever, and lies and decays on the ground where it falls; later in the season the fruit grows larger, and is gathered up and fed to the cows or to hogs. Some benefit is claimed, even if the flow of milk is not increased; the cows seem to have such a love for apples that they will not content themselves to feed until they have visited each tree within their reach and secured every apple that the breeze may have caused to fall. Hogs are also passionately fond of apples, especially the sweet varieties, and have in some instances been fed for weeks on little else, and still have thriven well.

The ten varieties which have proved themselves to be entitled to the rank of best in Essex County are the Baldwin, Rhode Island Greening, Hunt Russet, Gravenstein, Red Astrachan, Hurlburt, Porter, Hubbardston Nonsuch, Danvers Winter Sweet and Williams Favorite. These ten varieties embrace those which have proved themselves the most prolific and constant bearers, and whose fruit is the most sought for by those who have to buy. There are, however, other kinds, which might be added, that rank high, and which we would scarcely be willing to omit; yet we are constrained to say that for profit our belief is that a few varieties of those kinds which are most prolific and reliable, well cared for, would be of far more profit to the owner than an increased number of sorts.

A gentleman of my acquaintance, who has given his attention to the cultivation of fruit for the last sixty years, tells me that he would sooner have less than more than ten varieties, for any purpose either for pleasure or profit.

For table fruits, we should say the five best would be, Williams Favorite, Gravenstein, Hubbardston Nonsuch, Baldwin and Hunt Russet. I have named them in the order that they are ripe and ready for use. We would gladly add the names of the Hurlburt, Eustis, Drap d'Or, Sweet Baldwin, Ramsdell's Red and Gillyflower, but among the hundreds of varieties to select from we become bewildered, and are quite willing to leave it to each person to select such as suits his or her taste, well knowing that the most fastidious can be suited. All of the varieties I have named are abundant bearers, the Baldwin, Gravenstein, Hunt Russet and Hubbardston Nonsuch particularly so.

The Baldwin I have placed at the head of all the varieties. We are free to grant it the title of king of all the apples, for our soil and climate. While the other sorts, some of them, contest the title and vie with it for the honors of royalty, still the Baldwin wears the crown, for productiveness, long-keeping, general uses, and for market.

While all the apple-trees are alike in one sense, and have the same nature, the ash of the wood and foliage being identical, and scarcely differing in the most minute particular, still, like men and animals, each variety seems to have eccentricities and peculiarities of its own. Some, like the maple, lift high their erect and shapely branches. Others, like the oak, spread wide their limbs, and shade the soil for rods around. Others still, are crooked and gnarled, suggestive of sour and crabbed fruit. Some are sleek and smooth of limb, while others wear a rough and scaly coat, but boast of blossoms fair, and luscious fruit. Some have pendulous branches, like the willow, and their fruit hangs swinging with every breeze, and joyfully seems to pass the time from summer to harvest. The fruit-spurs of some are stiff and strong, and the fruit adheres closely to the branches and remains stationary till suddenly disturbed. All of these different habits or peculiarities are so marked and distinct, that the cultivator can easily determine by the tree just what kind of fruit it bears, and in his selection of trees in the nursery, can decide the different varieties by the color of foliage and general habits of growth.

There is much that might be said and written in favor of the cultivation of the apple; there is no fruit that so largely enters into all the different uses to which we are in the habit of putting fruit. For culinary purposes the apple is far ahead of all other fruits; for the table it is not surpassed; for preserves and drying, no other fruit is so universally used. In fact the apple is our constant friend; from July to July again we have it on our tables, and with us it is a joy forever. Year after year we are greeted with the rich abundance of our orchards. When the trees of the Old Bay State fail to give us returns, we turn to the Empire State and the great West for a supply, and seldom look to them in vain. If the trees in one section of our country fail to produce an abundant crop, those of other sections fail not, and transportation from one place to another makes the supply universal, and distributes the luxury with a balance as just as the wants of demand and supply call for.

Statement of T. C. Thurlow of West Newbury.

We have now about eight hundred apple-trees, and over twenty-five varieties. The soil is generally a good gravelly loam, with a sandy or gravelly subsoil. A very large proportion are Baldwins,—budded trees taken from our nursery, and planted in orchard-rows from 1850 to 1855. The orchards were for several years cultivated,—two or three times planted with corn or potatoes; but for the last sixteen or seventeen years have been down to grass, and for ten years or more pastured with sheep. The trees have not been enriched in any other way, except a small portion of the orchard, which has been partially cultivated, and two or three dressings of barn-yard manure, ploughed in.

Occasionally, we see a borer, which is, or ought to be, immediately dug out, or killed with a pointed wire. When our trees were young, they were washed every year in June, with soft-soap and water (half-and-half), which killed all the borers' eggs (if there were any), and was otherwise beneficial to the trees. Of late years this has been neglected; hence the increase of the borer.

We have been troubled with canker-worms since 1860. More than half our trees were entirely ruined by them within five or six years of their first appearance, and our apple crop reduced to merely nothing,—from eight hundred barrels a year before their appearance, to less than *a single barrel* of all kinds six or seven years afterwards,—and our trees reduced from four thousand in 1860 to eight hundred at the present time; although they were planted much too thickly at the commencement. After trying various remedies, we have decided that printers' ink, applied fall and spring, is the cheapest and most effectual. Our trees this year produced over nine hundred barrels of good merchantable apples. The tent caterpillar is at all times very troublesome, but can easily be taken off, when small, with the hand or a stiff, conical brush. No other insects to any extent trouble our apple-trees. The field-mice did considerable damage to our young trees during one or two winters, but care should be taken not to allow grass or other rubbish to accumulate around the trees, and thus afford them a shelter.

We try to prune our trees a little every winter; should prefer the mild weather during February and March. For young orchard or nursery trees, would trim in June. The wormy fruit that drops is generally disposed of by the sheep and other animals.

For the ten most profitable apples for this county, I would name the following (the most valuable first): Baldwin, Hubbardston Nonsuch, Roxbury Russet (for heavy land), Hunt Russet, King of Tompkins County, Rhode Island Greening, Red Astrachan, Gravenstein, Porter, Danvers Winter Sweet.

For five best varieties for table use, I would suggest Williams Favorite, Large Yellow Bough, Gravenstein, Hunt Russet and King of Tompkins County. They are all good bearers. There are probably many other excellent varieties that would do well in this county, but these are old and tried, and no one would go very far astray in planting them. Some of these will do well on a light soil with very little cultivation, while others require a rich soil and very high cultivation.

Statement of a Gentleman of Groveland.

I have perhaps fifty apple-trees, consisting of Northern Spy, Hubbardston Nonsuch, Baldwin and Roxbury Russet, for winter use, and Gravenstein and Porter for the fall, growing on a variety of soil, with a subsoil of slate or gravel, with no especial pains to enrich, but growing upon the natural soil. My trees are most of them thirty or more years old; some of them, however, have been grafted within ten years, and upon these I have had the best crops.

While all around me the canker-worm has been busy, I have as yet escaped, but until this year have had plenty of caterpillars, but consider them of but little account and easily managed when compared with the canker-worm. I know of no way to get rid of the borer or the latter worm when once they favor you with a call.

Upon the question of pruning, I know there exists a variety of opinions. I always prune when I see the need, without regard to time of year, preferring to do so when the tree is bare; if done in the spring or summer, when the tree is full of sap, very much care must be used to prevent the bark from being injured.

You ask what disposition I make of the wormy fruit that drops. The most profitable use I can make of such apples is to sell them to some neighbor who appreciates early-made cider.

Of the five best varieties, for this part of the county at least, I would name first the Gravenstein, then the Northern Spy, Baldwin, Roxbury and Hunt Russets. I am of the opinion that Northern Essex is the most favorable section to be found for the first-named variety. I have visited many times the exhibitions of the Massachusetts Horticultural Society, and very many of the county exhibitions in various parts of the State, also the state fairs of New Hampshire and Maine, and have never seen so good specimens as are here grown. My trees of this variety are upon grafts say from six to ten years old, put into vigorous trees, which bore profusely this year bushels of apples that would measure twelve inches in circumference each.

The Northern Spy, for a late apple, is my favorite. I had been fearful this variety would be a failure with us, and some parties had begun to graft them over on account of their slowness in coming into bearing, and the fruit rotting on the trees, their ill shape, their lateness in putting out in the spring; but this year they have redeemed themselves, and take the first rank, have all produced heavy crops of choice apples, and at this date outsell any other variety by fifty cents to a dollar a barrel.

Statement of R. C. Ware, for B. P. Ware, of Marblehead.

We have three hundred and thirty trees, of twenty-six different kinds. The soil is a loam, with gravelly subsoil and clay below the gravel; the trees manured with compost in the spring. They are treated very much like other crops, and are from fifteen to fifty years old. The young orchard was started by setting the young trees twenty feet apart; the trees were budded when two years old. The orchard has been cultivated ever since the trees were set out, and the trees severely pruned, with the hope of keeping them small and of bringing them into early bearing. The trees, however, wouldn't be kept small, and are now so thick that nearly every other tree will have to be removed this year.

We have very little trouble from borers. They are sometimes hunted with a pliable stick or wire. Caterpillars are kept down by picking off the young nests. Canker-worms are kept off by tarred paper and printers' ink, applied fall and spring; otherwise the leaves would be all eaten off the trees by these worms. The trees are pruned nearly every April. No special care is taken of wormy fruit that drops.

Baldwin, Pickman Pippin, Drap d'Or, Roxbury Russet, Danvers Winter Sweet, Sweet Baldwin, Greening, Early Williams, Gravenstein, Porter, Shepard's Sweeting, Kilham Hill, Peck's Pleasant, Phillips Pippin and Lyscom, are all good varieties; but Drap d'Or, Pickman Pippin, Baldwin, Early Williams, Roxbury Russet and Sweet Baldwin are the most profitable to raise for market.

For table, Early Williams, Porter, Gravenstein, Drap d'Or, Lyscom, Kilham Hill, Baldwin and Roxbury Russet give a constant and excellent supply from August 15 to June 1.

The Drap d'Or is a very abundant bearer, the others quite good. The Lyscom and Kilham Hill are of little value, except for table, and are not profitable for market. The Pickman Pippin is considered the best cooking apple in the market, by those who know it. It is very tart, high flavored, fine grained, and of good size; it keeps until February. The trees come into bearing late, but bear pretty well after they begin. The Drap d'Or is a very large fall apple, tart, but excellent for eating as well as cooking. It keeps well until the middle of November. The trees come into bearing young, and bear very heavily. As the trees grow older, the apples do not grow quite so large.

I will add the following remarks as the result of my observation: Trees not in an orchard seldom bear. Trees that do not bear good apples are worse than useless. There are only a few varieties that pay. It is better to raise only those varieties that do pay. Where there are only a few trees of a kind, there are not enough of that kind of apples raised to pay for marketing, consequently they are often wasted. An apple that is unknown in the market is hard to sell. Neglected trees are of no use.

Statement of J. B. Marston of Danvers.

I have grown in my garden a few apple-trees of about fifteen years' growth. I have but four different kinds. The soil is well fertilized. The subsoil is loam. With regard to the treatment of young trees, I believe in thorough tilling of the soil, and keeping the ground light about the roots, and free from weeds. To fertilize the soil, I use a compost of animal manure and decayed vegetation, together with a liberal share of superphosphate of lime and wood ashes. This is applied to the land in planting time, in the hills and rows, with a portion around the trees, dug in with a fork. My plan of preparing the manure is to fork over the compost-heap in early spring, adding by degrees the superphosphate and ashes, until the whole is well mixed. Then leaving it awhile to ferment and heat through, it becomes in good condition for use.

It is of the first importance, in my opinion, in the cultivation of apple-trees, to take care of the roots. It is well to look after and destroy the insects; but if the roots are neglected, I think that we shall find worms more plenty than fruit. I don't believe in the way that some have of tearing up the roots with a plough. It is better, I think, to keep the ground light by digging around the trees with a fork.

As for the insects, I am not much troubled with borers of any kind; when I find any in my apple-trees, I choke them with hard soap. The caterpillars are exorcised on the point of a long pole, and the canker-worms are treated to a coat of tar. My trees are pruned (but not excessively) in the month of May; the cuts on the larger branches I cover with paint. My wormy fruit I bury deep in the ground, away from the trees. With regard to the choice of apples, I think that must depend principally on the taste and fancy peculiar to each individual, and among the great varieties of apples produced, it seems as though every one ought to be gratified. It is well, perhaps, that personal tastes and fancies differ, as otherwise some things now considered very choice would be entirely neglected.

Statement of James Flint of Middleton.

I have about five hundred apple-trees; about one hundred are old ones, that were on the place when I took it; the rest I have set myself. I have over forty different kinds, which are more than I wish I had. I do not think it a good plan to have so many varieties. I have in my orchard loam and gravelly subsoil, enriched by barn-yard manure in the spring of the year. I commenced, about thirty-two years ago, by setting over a hundred, and have set some occasionally since, until within ten or fifteen years. I ploughed the land deep before setting, by going twice in the same furrow, digging large holes and keeping the ground cultivated, washing occasionally, when small, with potash water.

I am troubled some with the borer, not with the canker-worm or caterpillar, or much with any other worm. The winters have hurt my trees more than anything else. Take the borer in season, with a knife and wire, and you can soon fix him. I trim my trees late in the fall or early winter, cutting off the dead wood and limbs that cross each other. I have found by sad experience that it is injurious to trim after the sap begins to flow. The last day of June may be as good a time, but we are apt to be more busy, and in fields that are in grass it is not so convenient. The wormy fruit I sell or make into cider.

The ten or more varieties of apples to cultivate in this county, are: 1, the Red Astrachan,—an early variety, a good bearer, and good for market; 2, Williams Favorite,—a very showy apple, a good bearer, and finds ready market; 3, Gravenstein,—a very superior apple, but not a great bearer, or very salable fruit; 4, Porter,—profitable for cultivation, and a good bearer; 5, Hubbardston,—a very superior apple, a great bearer, and in eating just before the Baldwin, one of the best; 6, Hurlburt,—a very good apple, and worthy of extensive cultivation, resembling the Gravenstein; 7, Danvers Sweet,—a very good sweet apple, though it water-cores in some soils; 8, Sudbury Sweet,—a very superior apple for baking, or boiled in molasses water, after paring and taking out the cores; I always found a ready market for it; 9, Edwards Russet,—a very good apple, large size, and a great bearer; it bears every year with me; 10, Baldwin,—a very good apple, and will recommend itself, though I think it affected by cold winters more than almost any other variety; 11, Ramsdell's Red,—a very showy apple, resembling the Williams Favorite; a very great bearer, good eating, and good for market; 12, Rhode Island Greening,—a very salable fruit; I think it requires a very strong soil; it does not bear as well with me as I should like; 13, Fall Harvey,—a good apple for cooking or table, and of excellent flavor where the soil suits it; I find great difference in that respect; 14, Ladies' Sweet,—a very good apple, and valuable for its late keeping; a great bearer.

The five or more varieties which are best for the table, are, Williams Favorite, Porter, Gravenstein, Hubbardston, Hurlburt, and Baldwin. I find that to raise good apples they must be well taken care of, and the better they are cultivated the better apples you will get; and I have learned by my own experience, and that of my neighbors, not to sow small grains among them, and allow them to ripen among them. It is very injurious, especially when they are young, rye in particular. I had an orchard that I wanted to lay down to grass, and I sowed oats, calculating to cut green for fodder. It so happened that I did not cut them until ripe; the trees were not very large; the bark on the south side was sun-scalded, so that it killed a good many, and the rest were not good for much.

As to grafting, I have had considerable experience, both for myself and others, and I find that sour apple grafts put into sweet stocks are not apt to do so well as those of a sweet or a milder flavor. I think it best to take only those limbs you want to graft, so as to make a well-balanced head, and leave the rest on the tree till another year. I think it best not to take off too much at once.

Statement of John H. Sears of Danvers.

I have two hundred and fifty apple-trees under cultivation, and fifty more (most of which are grafted) in pasture land (fifteen varieties). Our soil is from six to fifteen inches dark loam, underlaid by yellow loam of from one to four feet in depth. The next lower deposit is a very hard loamy gravel. This soil may be considered as the general form of that of North Danvers. Young trees, in my experience, should be kept under cultivation for twelve or fifteen years, for the plough will keep the surface roots thinned out, and those directed down in the subsoil, which are its principal source of nourishment during our seasons of drought, grow deeper and stronger, giving a firmer support to resist the power of the high winds, which will, if the roots are more on the surface, so rock the tree as to displace the roots, and, as is often the case, overturn it. For old trees, once in five years is often enough to turn the sod over, and if it is well cultivated the first year to corn, the second to potatoes, the third to Hungarian and grass-seed, which crops can in most orchards be successfully cultivated, it will be in good condition, as far as the roots are concerned, to reward the owner with good crops.

Our trees are nearly all in bearing. One orchard of one hundred trees, which, when planted, in May, 1858, were one inch in diameter, New York trees, are now some of them eight inches in diameter. The soil is rich loam, but very shallow, the ledges often coming to the surface. Borers, caterpillars and canker-worms destroy the beauty of most orchards in this neighborhood. I dig out the borers with a sharp knife, or probe for them with a piece of small-sized wire, partly hooked at the end, whenever I see any signs of them. Caterpillars are quickest destroyed by gathering their eggs after the leaves have fallen; as they are usually on the ends of the branches they are easily detected, and after I gather them I burn them up.

The canker-worm is the worst pest to deal with. She must be kept down from the trees, for she will deposit her eggs under the loose scales of bark, either on the body or limbs of the tree, and so many of them that it is impossible to destroy them. I have tried several methods to keep the grubs from going up, and I think that a strip of tarred paper tacked around the body of the tree, and the preparation called printers' ink, thinned with petroleum, put on with a brush, if attended to, will destroy as many grubs, and with less damage to the tree, than any other mode.

In pruning trees, I take off a limb at any season of the year when I see a chance to improve the shape of the tree, or when one limb interferes with another. If trees have not been pruned gradually, as they have grown, and want much wood removed at once, I usually take the month of March, as the dry winds at that time will dry the cut wood, causing it to shrink, and affording a good chance to heal over. Our wormy windfalls we grind and turn to vinegar, or throw them to the hogs.

I consider Tompkins County King, Baldwin, Rhode Island Greening, Hubbardston Nonsuch, Roxbury Russet, Danvers Sweet, Tolman's Sweet, Gravenstein, Red Astrachan, Williams Favorite and the Gillyflower, eleven excellent varieties, both as good bearers and fine fruit. As a late winter apple, Tompkins County King stands in advance for the table; as a late fall, Hubbardston Nonsuch and Tolman's Sweet; as an early fall, Williams Favorite or Gravenstein; and for an early apple, Gillyflower or Red Astrachan. The Gravenstein, in this section, when grafted on a young stock, is apt to be a short-lived tree, and on the other hand, when grafted on limbs of large trees, it continues healthy many years. The Blue Pearmain, though a fine-flavored apple, soon commences to decay.

Statement of Benj. F. Huntington of Amesbury.

Strawberry Crop.—The crop of strawberries which I present for premium, was raised the present year on ninety rods of land which were the preceding year planted with potatoes, and in the spring of 1875 were manured with five cords of stable manure and fifty bushels of ashes, which I estimate at one-half the cost, the other half remaining in the soil for future crops. The plants were set in May, 1875, in rows three feet apart and twenty inches apart in the rows, making beds five and one-half feet wide and paths one and one-half wide. The runners were allowed to grow and fill the space between the rows. In the autumn, about the middle of November, the whole piece was mulched with a light coat of pine leaves, which was left on the following summer. On top of the pine leaves was put a good coat of meadow hay, which was removed about the middle of April.

The manure was harrowed in with a Randall harrow (which, by the way, is an excellent tool to have on a farm). When I entered my crop (about the middle of June), the plants were looking finely, but soon after, the rust injured the vines very much, so that I cannot report over two-thirds of an average crop.

The following is the cost of cultivation:—

Dr.

Preparing ground, setting plants, weeding, etc., 33 days,	$49 50
Picking 2,700 boxes, at 2½ cents,	67 50
Marketing,	15 00
Manure and ashes,	25 00
	$157 00

Cr.

By 2,700 boxes of berries, at 15 cents,	$405 00
2,500 plants sold,	12 50
	$417 50
Balance in favor of crop,	$260 50

PLYMOUTH.

Statement of Lysander R. Hall of Bridgewater.

STRAWBERRIES.—The plot on which my strawberries grew is a dark moist loam, and contains sixty-three rods. It was in corn in 1873, manured with five cords of barn-yard manure to the acre, and yielding about forty bushels of corn to the acre. April, 1874, ploughed seven inches deep, and harrowed and furrowed. Six loads of manure were then put in the furrow and covered up. The plants, Downer's Prolific, were set one foot apart in the furrow. Cultivated and hoed five times. The vines were covered with leaves in the winter of 1875.

Product.

1,200 boxes in 1875, sold at an average of 17 cents per box,	$204 00
1,056 " in 1876, that turned me in	157 50
Making, for both years,	$361 50

Expenses.

Ploughing, etc.,	$3 00
Manure,	6 00
Plants and setting,	5 00
Cultivation,	10 00
Covering with leaves,	2 50
Picking in 1875,	24 00
in 1876,	11 00
Total,	$61 50
Leaving a profit of	$300 00

Statement of John F. Alden of Middleborough.

The plot on which my strawberries grew is a light, sandy loam, and contains forty-two rods. Planted with beans in 1874, applying five bushels of ashes. May 1, 1875, it was ploughed nine inches deep, harrowed and furrowed four feet apart; three loads of stable manure were put in the furrows and covered over. Twenty-six hundred and forty plants, of the Wilson variety, were set in the furrows about thirteen inches apart. Cultivated and hoed twice. Mulched lightly with brakes the last of November, the most of which was allowed to remain through summer. I picked this season 350 boxes, and shall probably get, next season, 175 boxes. The plants are looking well now, for plants raised by this *cheap* method of culture.

Expenses.

Ploughing,	$1 25
Manure,	6 00
Plants and setting,	10 25
Cultivation and mulching,	4 00
Picking,	5 25
Total,	$26 75

INDIAN CORN.

MIDDLESEX SOUTH.

Statement of Sturtevant Brothers of South Framingham.

The eight-acre field which we offer for your consideration, in competition for the premium offered for the best experiment in raising corn, is the same field which received the first premium last year, and its history is furnished in last year's report, to which we refer you.

We consider the fact that this field was in corn last year as part of an experiment, testing the values of commercial fertilizers for the farmer's use. The crop reported last year was 82½ bushels, and the fertilizer used was the Stockbridge formula for corn, at an expense of $30.70 an acre.

We commenced operations this spring on April 3, and on this day and April 12 we broadcasted 2,158 pounds of ammoniated superphosphate, at an expenditure for labor of eight hours of man and sixteen hours of horse. May 1, we commenced ploughing, using the gang plough, and this took 22½ hours of man and forty-five hours of horse labor. As this was experimental work, more time was occupied than otherwise would have been necessary. May 11 and 17, we expended eighteen hours of man and thirty-six hours of horse labor in broadcasting, and 14½ hours of man in hill distribution of the following fertilizer:—

Sulphate ammonia,	1,200	pounds.
Dried blood,	2,400	"
Muriate potash,	1,150	"
Nitrate of soda,	650	"
Rectified guano,	1,120	"
Sulphate of potash,	1,140	"
Ammoniated superphosphate,	800	"

The cost of this fertilizer was $336.86 for the whole field, or $42.10 per acre. This fertilizer was harrowed in, the time occupied being twelve hours of man and twenty-four of horse. We commenced planting May 15, using a home-made machine which planted in drills three feet apart, and dropped the corn, one kernel every six inches in the drill. The time occupied was eight hours of horse and sixteen hours of man labor. May 17, we expended five hours of man labor, and on May 25, two hours, applying fertilizer which was left over to the drills.

The cultivation used was Rosa's system of horse-hoeing. We occupied 15½ hours of man and 15½ hours of horse labor for cultivating, and 35½ hours of man and the same of horse labor for the horse-hoeing, and 9½ hours of man and horse in hilling. We commenced cutting and stooking the corn in this field, September 7, and the time occupied was in all 185 hours.

Our labor this year has not cost us over $1.50 a day, and we have hired some for less. We estimate the cost of harvesting the stover and grain as two days labor of man and horses per acre. Let us now present our result in tabular form :—

For Eight Acres.

	Man Labor. Hours.	Horse Labor. Hours.	Cost.
Ploughing,	22½	45	$6 75
Harrowing,	12	24	3 60
Applying fertilizer,	47½	52	11 02
Planting,	24	16	4 80
Cultivating and hoeing,	68¾	68¾	15 47
Cutting and stooking,	185	–	27 75
Estimate for harvesting,	160	160	36 00
Total labor,	519¾	365¾	$105 39
Cost of fertilizer,			$336 86
Add husking, 1,928 baskets, at 4 cents,			77 12
And we have for total cost,			$519 37
Or, per acre,			64 92

We therefore present the following account :—

Dr.	
Cost of crop,	$64 92
Cr.	
Fodder, 4.82 tons, at $8,	38 56
Total cost of 120½ bushels corn (85 lbs. per bush.),	$26 36
Or, cost, per bushel,	21$\frac{8}{10}$

All which is respectfully submitted, the crop given being in accordance with your finding.

HAMPDEN.

Statement of H. M. Sessions of South Wilbraham.

The five acres of corn inspected by your Committee were planted May 24 and 25. The crop was preceded by a crop of corn and potatoes. Seventy-five two-horse loads of manure, or about twenty-five cords, were ploughed under in the spring, and a compost of plaster and sheep and hen manure dropped in the hills. The improved eight-rowed Demond corn, a premium string from West Springfield, was the seed used; planting by hand in rows three feet apart each way. The piece was cultivated both ways and hoed the last week in June. The second hoeing was done entirely with a horse-hoe. I cut and shocked the corn the first week in September; it was husked in October for five cents a bushel by contract, 492 bushels of ears. On the first of December, two bushels of ears yielded 70½ pounds of shelled corn, the cobs of the same weighing 14½ pounds. At that rate, the yield would be 57⅘ bushels per acre.

On half an acre of this field, and near the middle, about four-fifths of the formula of the Stockbridge fertilizer, for twenty-five bushels above the average yield, was applied, at an estimated cost of $11.20. This half-acre produced 72½ bushels of ears, or at the rate of 85⅙ bushels per acre. In other words, about 13¾ bushels of shelled corn on a half-acre, above the average yield, resulted from the Stockbridge fertilizer. How much the drought lessened the effect we cannot say. My statement is as follows:—

Cr.	
290 bushels of corn, at 75 cents,	$217 50
Corn-fodder,	60 00
Total,	$277 50

Dr.

Fitting ground and planting,	$17 50
Hoeing and cultivating,	25 00
Harvesting,	15 00
Husking,	24 60
Manure,	112 00
Total,	$194 10
Balance,	$83 40

This corn cost, therefore, $47\frac{1}{5}$ cents per bushel.

HAMPDEN EAST.

Statement of Horace Wallis, Jr., of Holland.

My field of corn contains one acre of land. In 1875, it was sward land; ploughed and planted with potatoes, with fifteen loads of barn-yard manure, spread and ploughed under seven inches deep, and with a small handful of plaster in each hill. In 1876, it was ploughed once eight inches deep; fifteen loads of compost manure ploughed in, and fifteen loads put in the hill. It was planted the 27th of May, rows three and a half by three feet apart; hoed three times.

Cost of manure (30 loads, $60, one-half to benefit the corn crop),	$30 00
Ploughing,	3 00
Harrowing,	1 00
Furrowing,	75
Seed-corn,	40
Planting,	2 00
Hoeing three times,	7 00
Harvesting,	10 00
Interest on land,	3 00
Total cost,	$57 15

I have harvested my corn, and find that it yields $86\frac{11}{36}$ bushels per acre, 72 pounds to the bushel. The whole crop was weighed.

Worth of corn per acre, $86\frac{11}{36}$ bushels, at $1 per bushel,	$86 31
Corn-fodder,	20 00
Total,	$106 31
Cost,	57 15
Balance in favor of corn,	$49 16

DEERFIELD VALLEY.

Statement of Frederick W. Hawks of Charlemont.

The amount of land upon which the crop of corn was grown, was one acre; the soil heavy, sandy loam. The crop of 1874 was grass; no manure was used that year. The crop of 1875 was grass, and no manure used. In preparing my ground for the present crop, I ploughed once, five inches deep, and harrowed once with Randall's pulverizing harrow. Cost of ploughing and other preparations, $3.50. I used 22 loads, of 30 bushels each, of sheep manure; this was spread evenly upon the surface, and worked into the soil with the pulverizing harrow. The value of the manure upon the ground was $42. I planted the 17th of May, by hand; cost of seed and planting, $3; distance in rows, 3½ feet; hills, 2½ feet; cultivated three times with a common cultivator, twice with Ross's horse-hoe, and once by hand. Cost of cultivation, $6. Harvested the 28th of August.

Cost of Crop.

Cost of ploughing, planting, cultivating, etc,	$12 50
Cost of harvesting, husking, etc.,	10 00
Manure removed by crop,	21 00
Total cost of production,	$43 50

Value of Crop.

95 bushels shelled corn, at 80 cents per bushel,	$76 00
4,000 pounds of fodder,	15 00
Total,	$91 00
Profit,	$47 50

PLYMOUTH.

Statement of George W. Humphrey of Rochester.

Grain Crops.—Mr. Humphrey planted about fourteen acres to corn, about one-half being a heavy, gravelly loam, and the balance mostly a light, sandy soil. The larger part has been in grass several years without manure, and nothing but commercial fertilizers have been applied the present year. In his statement, Mr. Humphrey says:—

"I am fully satisfied that corn may be grown by the use of fertilizers for fifty cents per bushel, or less. In order to do it, however, labor as well as fertilizers must be applied judiciously. It is not fair to spend days cultivating around rocks, and grubbing up hedge-rows by the side of walls around small fields, and charge it all to the corn crop. It costs much less to cultivate one field of ten acres than ten fields of one acre. The less angles per acre the better, as much more can be accomplished in ploughing long furrows than short ones, as much less time is consumed in turning at the ends. And the same holds true of nearly all other operations required in raising a crop. The most improved implements should also be used, and as little hand labor employed as possible. I have removed and re-arranged walls and fences, until I have one field of five, one of twelve, one of fifteen, one of twenty, and one of nearly forty acres. The appearance of the place is much improved, and furrows one-third of a mile in length can be drawn without a turn.

"In raising my corn, I used four and one-half tons of the Brighton fertilizer, a portion of it having an addition of potash, and twenty-seven dollars' worth of the Stockbridge formula for corn. When I applied these three kinds, I did so with the intention of testing their comparative merits. But the season has been very unfavorable for any experiments of this nature, as the different varieties of soil, and the difference in location, whether on a knoll or in a hollow, has caused some portions of my field to be affected by the drought much more severely than others. I am unwilling, therefore, to express an opinion upon their comparative merits. Perhaps the best return was derived from a portion of the field where the Brighton fertilizer was used, and which had had an application of seventy-five bushels of ashes per acre six years ago. This result I account for, in part, by supposing that a portion of the potash of the ashes still remained in the soil, and, uniting with the nitrogen and phosphoric acid of the Brighton, formed a *complete* fertilizer. I think that when the Brighton is used, potash, in some form, should also be applied, in order to secure the best results. The kind of corn I planted is called, in this section, Rhode Island White; and, as it is used for making bolted meal, will command several cents per bushel more than the common kinds. I planted about fourteen acres, and harvested 1,047 baskets of ears, weighing forty pounds each, making about 493 bushels of shelled corn, which,—

At 90 cents per bushel, amounts to	$443 70
There were 20 tons of stover, worth $8 per ton,	160 00
Making the total product,	$603 70

Expenses.

Ploughing and harrowing,	$40 00
Fertilizers and application,	210 00
Cost of seed and planting,	8 00
Cultivating and hoeing, etc.,	30 00
Cutting up and shocking,	25 00
Harvesting and storing,	50 00
Total,	$363 00
Profits of crop, less the interest on investment,	240 70

Statement of Henry M. Porter of Halifax.

The acre on which my corn grew is a dark, sandy loam, and was in grass without dressing in 1874. In the spring of 1875, I spread forty loads of manure from my barn cellar, and planted it to corn. Last May, thirty loads of manure, of thirty bushels each, were spread on and ploughed in seven inches deep. It was then harrowed once and furrowed one way, and ten loads of manure put in the hills, which were two and one-half feet apart. On the 20th of May, it was planted with smutty white corn, using about twelve quarts, and putting four kernels in the hill. It was cultivated twice with a horse-hoe, and hoed twice by hand. October 12, the supervisor selected and harvested two rods, the weight of which was 93½ pounds, being at the rate of 88 bushels to the acre. I estimate that there were two tons of top-stalks and two and one-half tons of butts.

Expenses.

Ploughing, etc.,	$6 00
Manure,	40 00
Seed and planting,	4 00
Cultivation,	10 00
Harvesting,	14 00
Total,	$74 00

Statement of Josiah L. Bassett of Bridgewater.

The acre of corn entered by me for premium is a sandy loam, inclining to clay in some portions, and was in grass in 1874 and 1875, without dressing. Ploughed in the fall of 1875, about seven inches deep. Early last May, I applied twenty-five loads of good stable manure, one hundred and fifty bushels of ashes, and one hundred pounds of bone, which was well worked in with a harrow. May 12, furrowed three and one-half feet apart each way and planted with the smutty white corn. It was cultivated and hoed three times. Two rods were harvested by the supervisor, October 11, which weighed $81\frac{7}{8}$ pounds, or at the rate of $77\frac{5}{85}$ bushels per acre. There were, I think, about two and one-half tons of corn-fodder, worth $12 per ton.

Expenses.

Ploughing, etc.,	$5 00
Manure,	71 00
Seed and planting,	3 00
Cultivating and hoeing,	7 00
Harvesting,	11 00
Total,	$97 00

I think about one-half the value of the manure still remains in the ground.

SMALL GRAINS.

DEERFIELD VALLEY.

Statement of D. Canedy of Heath.

Wheat.—The piece of land upon which the wheat was sown contained one acre. The crop of 1874, grass, 1,000 pounds per acre. No manure was used that year. The crop of 1875 was corn and potatoes, manured with twelve cords of stable manure. The land was ploughed the fall previous, and the manure spread on in the spring of 1875. The soil is a gravelly clay loam; the stone, mica slate. For the present crop the land was ploughed once, six inches deep, and harrowed once. Cost of ploughing and other preparations, $3. No manure was used for the present crop. For seeding I used two bushels of spring wheat. Cost of seed and sowing, $5. Preparatory to sowing, I soaked my seed in strong brine the last day of April, and, the land being wet, it was not sown until May 16. I used the brine as a preventive against smut, none of which appeared in the field. The crop grew finely and promised a large yield, but the drought coming on just as it was in the milk, the grain stopped filling, and consequently, the berry was small. It was harvested August 15, at a cost of $7, including storing and threshing.

The product of wheat was 1,140 pounds, worth	$38 00
Two tons of straw, at $10 per ton, ...	20 00
Total value of crop, ...	$58 00
Cost of production, ...	$15 00
Interest on land, ...	3 00
Total, ...	$18 00
Profit, ...	$40 00

PLYMOUTH.

Statement of Charles M. Reed of West Bridgewater.

Rye.—The land on which the rye that I entered for premium grew is a clay loam, and measures one acre and ninety-eight rods. It was in grass in 1874, cutting about one and one-half tons per acre. In 1875, about one-half was planted to potatoes, and the balance, after mowing, was ploughed and sown to Hungarian grass, June 25. Three cords of barn-yard compost were applied to the potatoes and four cords to the part sown to the Hungarian grass. One hundred and forty bushels of potatoes and two tons of Hungarian hay were harvested that year. September 15, it was ploughed seven inches deep, eight hundred pounds of Davis's superphosphate sown, and well harrowed. Four bushels of rye were sown September 24, and harrowed in. The rye was mown by hand, July 11, and yielded $51\frac{1}{2}$ bushels of grain, or $31\frac{94}{100}$ bushels to the acre; and $3\frac{1}{2}$ tons, or 4,341 pounds per acre of straw.

Expenses.

Ploughing, etc.,	$5 00
Eight hundred pounds of phosphate,	18 00
Seed and sowing,	10 00
Harvesting and threshing,	17 65
Total,	$50 65

The profit, per acre, as I figure it, is nearly $40 00

Statement of Spencer Leonard of Bridgewater.

The land on which my rye grew contained $165\frac{1}{2}$ rods, was planted to Early Rose potatoes in April, 1875, was well manured, and produced a good crop. It is a sandy loam, with very few stones or rocks. About the first of September, it was ploughed seven inches deep. Sixty bushels leached ashes and three hundred pounds ground bone were spread broadcast, and five pecks of rye sowed, and the ground harrowed and rolled. The rye came up well and looked very vigorous until winter. It took an early start in the spring, and grew very rapidly. The dry, hot weather of the last half of June and first of July, I think, reduced the amount of grain several bushels. It was mowed, bound and shocked from the 10th to 12th, and threshed the 25th to 28th of July. Product: 1,825¾ pounds of grain, or at the rate of 31$\frac{52}{100}$ bushels per acre; and 4,270 pounds of straw, or at the rate of 4,128 pounds per acre.

Expenses.

Ploughing, harrowing, etc.,	$4 00
Seed and sowing,	1 65
Dressing,	25 00
Harvesting and threshing,	12 50
Interest on land,	4 50
Total,	$47 65

Statement of James Howard of West Bridgewater.

The land which grew my rye crop, containing one acre and three rods, is a rolling gravelly loam, and from its location and the texture of its soil, is very seriously affected by continued dry weather. I think the crop this year was several bushels less than it would have been with an ordinary degree of moisture. The field was in grass in 1874. Immediately after being mowed, it was ploughed and sown to Hungarian grass, with an application of one barrel each of Brighton and Davis's phosphate. It was in potatoes in 1875, manured in the hill, one-half with leached ashes and phosphate, and the rest with phosphate and German potash, mixed. September 30, 1875, it was ploughed about six inches deep, and, October 2, was sown with five pecks of rye. The time of sowing was later than I would recommend. In November, after the grain was up, about five cords of manure from the barn cellar were applied as a top-dressing. It was mowed and bound in bundles, July 8. Product: 1,392 pounds, or at the rate of 24⅖ bushels per acre, nearly; and about 3,500 pounds of straw.

Expenses.

Ploughing,	$3 50
Manure,	25 00
Seed and sowing,	4 00
Harvesting and threshing,	10 00
Total,	$42 50

Statement of Albert Thomas of Middleborough.

Oats.—I have raised the present year $41\frac{7}{16}$ bushels of oats upon 163 rods of land, being at the rate of $40\frac{2}{3}$ bushels per acre, nearly. The land, a sandy loam, was planted to corn in 1874, using forty loads of barn-cellar manure, and to potatoes in 1875, using six loads of manure. Last April, it was ploughed twice, eight inches deep, no manure being applied, and three bushels of common oats sowed. The oats were cradled in July.

Expenses.

Ploughing and harrowing,	$6 50
Seed and sowing,	4 00
Harvesting and threshing,	7 50
Total,	$18 00

There was about one and a half tons of straw.

Statement of Augustus H. Soule of Middleborough.

Barley.—The crop of barley which I entered for premium was raised upon one acre of gravelly loam, on grass for nine years, without manure. In 1875, it was planted to corn, manured with thirty loads of barn-cellar manure. In April, 1876, I applied ten loads of manure, ploughed six inches deep, and harrowed once before sowing, and once after. May 1, sowed two bushels of two-rowed barley. It came up well and grew rapidly—until the dry weather came on. Owing to its long continuance, the crop was ripened sooner than it ought to have been, and the yield was considerably diminished in consequence. It was harvested about July 20, threshed in August, and yielded $26\frac{5}{8}$ bushels of grain, and about 1,500 pounds of straw.

Expenses.

Ploughing, etc.,	$4 00
Manure,	10 00
Seed and sowing,	3 00
Harvesting and threshing,	5 00
Total,	$22 00

ROOT CROPS.

ESSEX.

From the Report of the Committee.

On reading the statements of the cost of producing the crops entered for the premiums of the society, this question naturally suggests itself. For what purpose does the society offer these premiums? Is it simply for the pleasure of paying out the amount awarded the successful competitor? or does it rather expect in return that their statements shall furnish some new ideas or information gained as to the cost of producing the crop in question?

No new information can be acquired unless we step out of the old routine, and endeavor by carefully conducted experiments to determine whether the new idea is an improvement on the old, or the new method demonstrated to be a success by the results.

If by using any of the many different kinds of concentrated fertilizers now in the market, we can produce as large a crop as we can by using barn or stable manure, and at one-half the cost of the latter, it is certainly a step in the right direction,—a step which we are all in favor of, that of *decreasing our expenses, and increasing our receipts.*

If, by taking a few hundred pounds of a concentrated fertilizer, and applying it by a few hours' labor to an acre of land, we can produce as large a crop of potatoes, squashes, onions, cabbages, or turnips, as could have been produced by the old and more laborious method of applying six cords of stable manure to the same, we have demonstrated practically a fact which commends itself at once to every farmer.

Many farmers do not know the cost of raising any given crop; keeping no record whereby they can judge whether they have made or lost by the operation. Many labor on in the old routine of applying a small amount of barn manure yearly, and adopting the old methods of cultivation, trusting to a propitious season to produce a paying crop.

At the present low rates which farm produce is bringing in the markets, the farmer of this vicinity must of necessity avail himself of every opportunity to lessen the cost of the same, if he would compete successfully with the more favored farmers who cultivate the fertile lands of the West.

Two years ago, in some experiments made to determine the comparative value of the following kinds of manure: muriate of potash, Brighton fertilizer, barn-cellar manure, for cabbages,—I broke up a piece of light loamy soil, on the twenty-sixth day of July, and harrowed and furrowed it on the 27th. On the 28th I manured six rows with a tablespoonful of muriate of potash, and six rows with a handful of Brighton blood fertilizer to each hill, mixing both kinds well with the soil. On the remaining six rows I put a good shovelful of fine barn-cellar manure to each hill. On the same day I set the whole piece to Fottler's Improved Brunswick cabbage plants, two and one-half by three feet apart. The plants all started finely, but those on the potash soon went ahead, showing very plainly that the potash was better adapted to their wants than either the blood or the barn-cellar manure, although they were doing very well. The piece was cultivated and hoed twice.

On harvesting the crop, almost every plant grown on the potash had a large solid head, with but very few loose leaves. Those grown on the Brighton blood fertilizer had done well, about three-fourths having made good-sized, solid heads. Those grown on the cellar manure had done very well, but evidently needed longer time to form as solid heads as those grown on the other two kinds of manure.

On the next season (1875), I tried the same kind of manure on the same piece of land, but changed the crop to potatoes, using the manures in the same manner as on the previous year. Planted the Late Rose in the second week in May. During the season they were cultivated and hoed twice. The result was somewhat changed; those on the blood fertilizer taking the lead, followed by the cellar manure,—the potash evidently being too caustic, the vines not looking thrifty. On digging, I found the crop a third larger on the blood manure than on either of the other two; the potatoes were larger, fairer, and more in a hill.

The experiment on cabbages, in 1874, having been so marked, to test it more fully, I again, in 1875, tried the same kinds of manure, but on a heavier soil. The piece was broken up about the 20th of July, and treated in the same manner as that the year before. The plants were set on the 25th. They started well, but were followed by very dry weather, so that no part of the piece did as well as the year before; still, those on the potash showed the best result.

I again tried the same experiment the past season, but varied it by sowing the seed in the hill on the 10th of June. The seed came up nicely, but the extreme dry weather that followed through June and July was very unfavorable to the young plants, especially to those on the Brighton fertilizer, a large part of the plants dying for want of moisture. Those sown on potash and barn manure withstood the drought much the best, and have yielded a very good crop.

In all three cases, the muriate of potash has produced the most satisfactory results, giving each time the largest product for the least expense.

We would respectfully suggest to members of the society, who intend to compete for premiums in the vegetable department, that instead of waiting for a crop that has happened to be better than usual (but why, they cannot tell), they select a piece of land of the required dimensions, dividing the same into as many parts as convenient, manuring each part differently, with such manures as convenience or fancy may suggest. Keep a careful watch throughout the season, noting particularly any difference which may appear in the several parts, whether for or against the crop, and tracing it, if possible, to the original cause, whether that may be owing to the manuring, depth of planting the seed, or varieties of the same, manner of cultivation, dryness or wetness of the season, or many other causes which may appear small in themselves, but which, combined, go far toward making the crop a success or a failure.

It is only by following such methods we can acquire the necessary information to conduct farming intelligently and profitably, and which every farmer should endeavor to obtain from his own experience.

Aaron Low, *Chairman.*

Statement of H. A. Stiles of Middleton.

English Turnips.—Having entered for inspection and premium my crop of summer English turnips for the market, it becomes my duty to report some of the obstacles encountered in growing this vegetable the present year. In no season within the history of my experience of twenty years in turnip-culture, has it come so near a failure as the present one.

Turnip-seeds were sown the last days of April and the first of May, and, germinating rather quickly, which is favorable to growth, seldom appeared more promising for a bountiful harvest. The time of harvesting and marketing the early turnip is from the 20th of June until the 20th of July, and before the former period the effects of dry weather were visible on portions of the crop, which continued with extreme heat to check the growth, injure the quality of the turnip, and seemingly lessen the quantity fully one-half of what it would have been with seasonable rains.

The most important requisite to the successful culture of the crop, is suitable land. Gardeners sometimes assert that they can raise just as good, clear and nice a turnip in autumn as can be grown. True, they may be grown clear upon land unfit for the early turnip, but a difference may be noticed in the quickness of growth, fineness of texture, and in its buttery flavor and glossy whiteness.

The best varieties for table use are the strap-leaved, white, and red-top. Questions are often propounded, like the following: What kind of land do you have? Do you use barn manure or fertilizers? Do you sow in drills or broadcast? Do you salt your lands? You must have some secret, of which you will not inform us, for we cannot get an early turnip fit to eat.

Having no secrets to reveal, I will briefly state my method of culture this year. In the first place, my land is light, sandy, loamy, and leachy; it is quite level and free from stones, and has been under cultivation a hundred years or more.

Lot No. 1 contains about one hundred rods. Ploughed April 20, using the Michigan sod-plough. It has been in grass for the last eight years, with no manure. Ploughed to the depth of nine inches. Applied evenly upon the furrows about three cords of barn-cellar manure, made fine, and harrowed it in with the Randall harrow. Applied two hundred pounds of Bradley's superphosphate of lime, harrowing again with the Randall, and smoothing the surface with the brush, the land was ready for the seed. Sowed at the rate of one pound to the acre, of seed, in drills eighteen inches apart, and, after the rough leaf appeared, the plants were left six inches apart.

Lot No. 2 contains eighty-seven rods. This lot has been in turnips two years. Applied two and one-half cords of barn manure with one hundred and seventy-five pounds of Bradley's superphosphate of lime, giving the land the same treatment as No. 1.

Lot No. 3 contains eighty rods. This lot has been in turnips one year. No barn manure was used on this lot. After harrowing with the Randall, I spread, by hand, broadcast on fifty rods of this lot, one bag of the Stockbridge fertilizer, of the formula recommended for the ruta-baga turnip. Weight of bag, two hundred pounds. Cost, $6. On the remaining thirty rods, spread one hundred pounds of Bradley's superphosphate, and harrowed both lots with the Randall harrow.

There was not much difference to be observed between the turnips, side by side. Have formed a favorable opinion of the Stockbridge fertilizer, and think it fully equal, if not superior, to Bradley's, for turnips. Turnips are taken from the ground when about three inches in diameter. After being trimmed and washed—using a brush,—are put in bunches, containing five in number. June 20, took from the ground forty bunches, and about six hundred before the fourth of July.

Sold, mostly in Lynn and Boston markets, about six thousand bunches, for which I received $300. Gathered in October, for stock-feeding, one hundred and fifteen bushels. Value, in cellar, twelve and a half cents per bushel. Total, $14.37½.

Judging from the past, and taking an average season, about ninety bushels, or four thousand bunches, would have been fit for market in July.

Dr.	
Cost of ploughing 267 rods,	$8 00
of barn manure, 5½ cords, and applying the same,	50 00
of fertilizers,	20 00
of weeding and hoeing,	50 00
of cleaning turnips and marketing,	70 00
Total,	$198 00
Cr.	
By 6,000 bunches,	$300 00
115 bushels, at 12½ cents,	14 37½
Total,	$314 37½
Balance,	$116 37½

Statement of Francis R. Appleton of Ipswich.

The half-acre of ruta-baga turnips, which I enter, was a part of a field of about one acre. They were planted in the middle of June, in drills two feet and a half apart. The soil is a heavy clay loam, thoroughly drained with tile, and has been in grass for the previous years. It was ploughed last fall, and again this spring, and thoroughly harrowed. To prepare the land for the seed, trenches were made with the plough, and barn-yard manure put in them,—twelve ox-cart loads in all,—for the half acre. These were then covered by the plough, making a ridge where before was a trench, and rolled. Just before the trenches were covered, there was sown upon the barn-yard manure a mixture of ashes, superphosphate of lime, plaster, and Brighton manure, in all, six bushels. The seed was put in with a hand-drill, care being taken to do this immediately after the rolling. It is important that the above operations should follow one another in quick succession, leaving the least possible interval between the stirring of the soil and the planting of the seed. The plants were thinned to about ten inches distance from each other. They were cultivated by a horse once, and the thinning and weeding was done by a man with a common hoe. The yield from the half-acre was two hundred and fifty-six bushels; weight, sixty-three pounds per bushel, or over eight tons in all for one-half acre.

This result is not satisfactory, nor does it equal the average crop of this farm, owing to the long drought. No rain of any account fell for two months after the seed was planted.

HAMPDEN.

Statement of H. M. Sessions of South Wilbraham.

POTATOES.—The one and one-half acres of land on which the crop was raised has been in pasture for eighteen years, and is situated on a dry hill of red sandstone soil, mixed with mica and hornblende slates. Twenty-five loads of stable manure (or about eight cords) were ploughed under, the first week in May. Planted the 10th and 12th of May, in drills, three feet apart, and twelve to fifteen inches in the drills; one to two eyes in a piece, and one piece in a hill. A small handful of compost (made of sheep and hen manure and plaster) was dropped on the potatoes before covering, and before the first hoeing, three barrels of ashes and plaster were applied to the plants. The varieties planted were the Early Vermont, Snowflake, White Peachblow, and a new seedling, known as the Copperhead. They were hoed twice, chiefly with a horse-hoe, the middle of June and the middle of July. The Early Vermonts were dug the 20th of September, the other varieties the middle of October. The potato bugs did not trouble the Early Vermonts and Snowflakes at all, nor the others until after the 1st of September. The crop set out for a large yield, but the bugs or drought, or both, checked their growth, and left a large quantity of small potatoes. They are all of good quality.

Cr.

132 bushels merchantable potatoes, at 90 cents,	$118 80
65 " small potatoes, at 20 cents,	13 00
Total bushels, 197,	$131 80

Dr.

Carting and spreading manure,	$10 00
Ploughing, harrowing and marketing,	8 00
Twelve bushels seed,	6 00
Planting,	13 50
First hoeing,	15 00
Second hoeing,	5 00
Digging, sorting and housing,	24 50
One-half the manure,	16 00
Total,	$98 00
Balance,	$33 80

HAMPDEN EAST.

Statement of Horace Wallis, Jr., of Holland.

Potatoes.—My field of Chili potatoes, entered for a premium from your society, contains one acre of sward land. It was ploughed and planted the last of May, with fifteen loads of barn-yard manure spread and ploughed under, seven inches deep, and with a small handful of plaster in each hill.

Cost of manure, 15 loads, $30, one-half for the benefit of the potato crop,	$15 00
Plaster,	1 50
Ploughing,	3 00
Seed-potatoes, 12 bushels, 40 cents per bushel,	4 80
Planting,	3 00
Hoeing twice,	4 00
Harvesting,	10 00
Interest on land,	3 00
Total cost,	$44 30

I have harvested my potatoes, and find that the "Chilis" yield, per acre, 159 bushels,—

At 85 cents per bushel,	$135 15
Cost,	44 30
Balance in favor of potatoes,	$90 85

The treatment and cost of the seedling potatoes on the home farm were the same as that of the potatoes on the Jones farm, $44.30.

The seedlings yield per acre 133 bushels, at 85 cents per bushel, amounting to	$113 05
Cost,	44 30
Balance in favor of potatoes,	$68 75

Statement of Horace P. Wakefield of Monson.

Carrots.—I submit a statement of a field of one acre of carrots. This field has been in grass for six or seven years. It was ploughed in August, 1875, manured slightly, and sown to English turnips. It was ploughed, harrowed, dragged, and sowed, in rows sixteen inches apart, and four pounds of seed to the acre, in May. It was manured at the rate of ten cords to the acre, from the barn-yard, spread on and ploughed in. The crop was weeded by hand, and harvested in October. The product was five hundred bushels on the acre.

One-eighth of this was manured with six dollars' worth of Stockbridge fertilizer, and I think the difference in yield, if any, was in favor of that manured by this fertilizer.

The crop, as inventoried by the appraisers, was		$225 00
Cost of ploughing, weeding and harvesting,	$40 50	
Manure,	70 00	
Fertilizer,	6 00	
		116 50
Apparent net profit,		$108 50

Deducting, however, from the cost of the manures, one-third thereof which remains in the land, the actual profit will amount to $134.83.

MANGOLDS.—I hereby submit a statement of a field of mangolds, containing four acres. It was planted with potatoes in 1875, ploughed twice in May, 1876, and harrowed, dragged, and sowed, May 20, in rows, thirty inches apart, and four pounds of seed to the acre. The cultivator was run through the field as often as the weeds sprang up, and the remainder were pulled by hand.

The crop was harvested the last week in October, and the product amounted to 2,480 bushels. Three-fourths of an acre on one end of the field was manured with Stockbridge fertilizer, at a cost of $21.

The appraised value of the crop was $1,116 00

Cost of Raising.

Cost of barn-yard manure,	$250 00	
of fertilizer,	21 00	
of seed,	3 00	
of ploughing,	28 00	
of hoeing	60 00	
of harvesting,	60 00	
		422 00
Apparent profit,		$694 00

Adding to this amount one-third of the value of the manures which remain in the land, $90.33, gives the actual profit of $784.33.

FRANKLIN.

Statement of F. H. Williams of Sunderland.

Turnips.—The land upon which his crop was raised, was about one hundred rods, and was in grass, in fair condition, in 1875, upon which was used twenty one-horse cartloads of horse, hog, and muck compost, ploughed July 21, about six inches deep, laying the furrows flat, and after beating so that no sods should turn up, was well harrowed, the manure being covered with a tobacco ridger and sowed in drills on these low ridges, two and one-half feet apart, with the strap-leaf variety, one pound of seed to the acre. Cultivated the crop once, hand-hoed once, and thinned. One rod of ground produced 271¼ pounds = 27,125 pounds on the one hundred rods, the tops having been cut before harvesting. Two rows were hauled together with a potato hook, then gathered into the cart.

Cost of Crop.

Seed,	$0 75
Manure,	20 00
Labor,	10 00
Harvesting,	10 00
Total,	$40 75
542½ bushels, at 20 cents,	108 50
Profit,	$67 75

DEERFIELD VALLEY.

Statement of E. C. Hawks of Charlemont.

Turnips.—The land on which my crop of turnips was grown—which I have entered in your society for premium—was Deerfield River bottom land, and nearly all sand, which had drifted upon it in the freshet of 1869. The crop of 1874 was potatoes, manured with stable manure, at the rate of ten cords per acre. The crop of 1875 was turnips, manured with stable manure, well composted with sandy loam, at the rate of eight cords per acre. For the present crop the land was ploughed but once, and that about the 10th of May, to a depth of about nine inches. The land was thoroughly pulverized with Randall's cylinder harrow, and finished with a common seed harrow. All coarse manure and cornstalks were then raked off, and the land rolled with a heavy roller. The cost of ploughing, harrowing, rolling, etc., was $5. I applied eight cords of long manure per acre, being well mixed with cornstalks, at a value of $40, upon the land. It was planted about May 20, with Harrington's seed-sower, in drills, fifteen inches apart. The seed was the Sweet German, used at the rate of one pound per acre. Cost of planting and seed, $1.75.

It was cultivated three times with Harrington's hand cultivator. Cost of cultivating, weeding, and thinning, $12. The crop was harvested November 13. The tops were cut off with a sharp hoe, and raked off. The roots were pulled with a strong potato-hook. Cost of harvesting and storing, $9.50. Weight of turnips on one-fourth acre, 14,780 pounds, or $246\frac{1}{3}$ bushels. Cost of raising, per bushel, about seven cents.

Statement of George Howes of Ashfield.

CARROTS.—The piece of land contained forty-four rods; the soil a clayey loam. The crop of 1874 was corn and potatoes; used one and one-half cords of stable manure. The crop of 1875 was beets and carrots; used three cords of stable manure. For the present crop used three cords of stable manure, which was spread on the surface and ploughed under, May 24.

Cost of Crop.

Value of manure upon the ground,	$5 00	
Ploughing and other preparations,		$6 64
(Sowed the 25th of May, in rows two feet apart. The variety of seed sown was the shorthorn and scarlet-horn.)		
Seed and sowing (cultivated by hand),		1 05
Cultivation, including weeding, etc.,		4 97
Harvesting (harvested Oct. 10),		4 20
Value of manure left in the ground,		2 50
Interest on land,		75
Total cost of production,		$20 11

Value of Crop.

150 bushels, at 40 cents per bushel,	$60 00
Value of tops for fodder,	2 50
Total value of crop,	$62 50
Profit,	$42 39

BRISTOL.

Statement of Nathan B. Gardner of Swansea.

Beets.—Area, one-quarter of an acre. The soil is a strong loam. I ploughed in the fall of 1875, and again the first of May, seven inches deep, and applied one-fourth ton of fish guano in the fall. Five loads of raked seaweed, and three loads of stable manure, were ploughed under in May. Fifty pounds of sulphate of potash (eighty-five per cent.), and Stockbridge's fertilizer for 167 bushels, were sown broadcast, just before planting. I planted, May 11, with Holbrook's seed-planter, in drills, thirty inches apart, two pounds of seed, of a variety called Norbiton's Giant. It was cultivated with horse cultivator twice, and hoed three times, and thinned to ten inches apart in the rows.

In raising beets I intend to apply to an acre sufficient nitrogen, and potash, and soluble phosphoric acid for 1,500 bushels; then give clean cultivation, and trust to Providence for the result. According to Professor Stockbridge's formula, one hundred bushels of beets require eleven pounds of nitrogen, twenty-five pounds actual potash, and six pounds of soluble phosphoric acid.

Expense.

Ploughing,	$1 50
Manure,	32 00
Seed and planting,	1 50
Cultivation,	4 50
Harvesting,	5 00
Total,	$44 50

Yield, 23,040 pounds.

PLYMOUTH.

Statement of Spencer Leonard of Bridgewater.

Turnips.—The ground which my turnips covered was forty rods, and the preparation of the ground was the same as for my potatoes, except that I spread upon the turnip ground twenty-five bushels of leached ashes. The turnips were planted June 24 with a machine, in rows thirty-four inches apart. Owing to the dry weather, they were slow in coming up, and in many places did not come up at all, and others were transplanted to fill up the vacant places. After the roots got hold, they grew vigorously, and the tops seemed to entirely cover the ground. November 1, one rod was harvested which weighed 273 pounds, or at the rate of 728 bushels to the acre.

Expenses.

Ploughing, etc.,	$3 00
Manure,	21 00
Seed and planting,	50
Cultivation,	3 00
Harvesting,	5 50
Total,	$33 00

Statement of James Howard of West Bridgewater.

Mangolds.—The plot on which my beets grew is a stiff gravelly loam, with a slight mixture of clay. The crop of 1874 was onions, manured with five cords of stable manure to the acre, with some salt, and manure from the poultry-yard. The crop of 1875 was the same as, and the treatment very similar to, that of 1874. Last April, twelve horse cart-loads of stable manure were ploughed in six inches deep, and eighty-five pounds of Bowker's fertilizer spread on top and worked in. April 28, sowed with a machine three-quarters of a pound of Long Red Mangold seed. Cultivated with a Ross cultivator, and hoed twice. Harvested the latter part of October. One rod, weighed by the supervisor, weighed 502½ pounds, equal to 1,340 bushels per acre. This crop, in the early part of the season, looked very promising, and, I think, in an ordinarily wet season would have been one-third larger than now. Soils like this seem to bake in a severe drought, and suffer much more than more sandy loams. I am often asked at what time to plant this vegetable, and would say, as early as the land is in suitable condition.

Statement of Josiah L. Bassett of Bridgewater.

MANGOLDS.—The land on which my beets grew has been used as a garden and for the cultivation of roots, for the last two years, and has been liberally manured. The soil is a dark sandy loam. Last spring, eight loads of compost were spread on, and ploughed in about eight inches deep. It was then furrowed twenty inches apart, and eight loads of compost, with two hundred pounds of ground bone, put in the furrow. Planted May 16, by hand, using about one pound of Long Red Mangold seed. Cultivated and hoed three times. October 11, one rod was harvested, which weighed 482½ pounds, or at the rate of 1,286⅔ bushels per acre.

Expenses.

Ploughing, etc.,	$4 00
Manure,	28 00
Seed and planting,	5 00
Cultivation,	12 00
Harvesting,	8 00
Total,	$57 00

Statement of Heman Copeland of West Bridgewater.

CARROTS.—The plot on which my carrots grew is a heavy loam, in potatoes in 1874, and in cabbages in 1875, being well manured both years. The first of last May, two cords of manure were ploughed in eight inches deep, and 375 pounds of phosphates harrowed in. May 11, sowed with a machine, using three-quarters of a pound of Danvers Orange seed. Shuffle-hoed three times, and weeded by hand twice. October 17, the supervisor harvested one rod, which weighed 409 pounds, or at the rate of 1,189$\frac{45}{55}$ bushels per acre.

Expenses.

Ploughing, etc.,	$1 50
Manure,	29 00
Seed and sowing,	1 75
Cultivation,	5 25
Harvesting,	5 50
Total,	$43 00

When this plot was planted, I supposed it contained forty rods, and expected to weigh the whole crop as the product of forty rods; but when measured by the supervisor, it was found to contain but thirty-five rods.

Statement of Albert Thomas of Middleborough.

POTATOES.—The eighty rods on which my potatoes grew is a strong sandy loam, and was in grass, without dressing, in 1874. Last year I planted it to corn, using about forty loads of barn-yard manure to the acre. Last May, it was ploughed twice, about nine inches deep, turning under ten loads of manure to the acre, and harrowed and furrowed. It was planted the last of May with the Early Rose and Davis Seedlings, about eight bushels to the acre. One-third was manured in the hill with hen manure and plaster, and one-third with plaster. The hen manure and plaster produced the best crop.

Cultivated and hoed twice. October 3, harvested one rod, which weighed 103 pounds, or at the rate of 274$\frac{2}{3}$ bushels per acre.

Expenses.

Ploughing, etc.,	$5 00
Manure,	8 00
Seed and planting,	5 00
Cultivation,	2 50
Harvesting,	5 00
Total	$25 50

Statement of Spencer Leonard of Bridgewater.

Potatoes.—The ground where my potatoes grew contained eighty rods; had been in grass several years without dressing. It was ploughed September 1, 1875, and sowed to rye, putting on eight hundred pounds of ground bone per acre. May 20, ten loads of stable compost was spread on, and, with the rye, ploughed in seven or eight inches deep, well harrowed and bushed, and planted with Davis Seedlings. The potatoes came up very quick and even, and grew remarkably well for awhile; but the dry weather of July, August and September checked the growth of the tubers very much, reducing the amount of potatoes, I should judge, nearly one-half. The Colorado beetle appeared upon the plants in fair numbers, late in the season, but I do not think caused much injury to the crop. September 25, one rod was harvested that weighed 78½ pounds, or at the rate of 209⅓ bushels to the acre.

Expenses.

Ploughing twice, harrowing, etc.,	$6 00
Manure,	32 00
Seed and planting,	5 50
Cultivating and hoeing,	2 75
Harvesting,	6 00
Total,	$52 25

MARTHA'S VINEYARD.

From the Report of the Committee.

Potatoes.—The potato is a native of America, having been found growing spontaneously near Valparaiso in about the year 1550. It has since been found growing wild in the mountains of Mexico and Central America.

The sweet potato originated in Asia, and was imported into Europe long before the American or Irish potato. Sir Walter Raleigh first carried potatoes into Ireland and planted them in his garden in 1610. It was many years afterwards before they were planted in fields for a crop. They were carried over into Scotland about 1725, but met with strong opposition from the various religious factions, because not mentioned in the Bible. The people of France were also opposed to their introduction, and looked upon them with great aversion. The nobility unsuccessfully attempted to make them popular. At last notices were posted around a field planted with them, near Paris, that whoever stole any should be severely punished. The planters had the right view of human nature, for very soon they were all stolen and carried away by the common people. Henceforth they were popular. The most important constituents of the potato are starch and albumen. The amount of starch increases as the season advances. The potato is especially adapted to be eaten with meat, which contains much nitrogen, as it supplies the elements wanting in that food.

It is useless to attempt to lay down any arbitrary rule for the culture of the potato. Farmers are placed under such different circumstances that different practices must prevail in different localities.

The best potato land is said to be a sandy loam, recently burned over. We have but little such land with us, and perhaps the next best is a light, loamy sward; say a mellow piece of old pasture, moist, but not too damp, and fertile enough to yield two hundred bushels to the acre with the aid of some alkaline fertilizer in the hill, than which there is none better than decomposed or composted rock-weed and kelp, which abound upon our shores.

The potato will not bear strong manure in the hill without bad results. Oftentimes strong manure may be used to promote a quick, early growth, but for late potatoes the seed should not be in immediate contact with strong manure. It is the opinion of most writers that manure should be sown broadcast on the furrows and harrowed in. This thoroughly mixes it with the surface, and the after-cultivation fully prepares it for plant-food.

Potatoes are of better quality on light, mellow land than on a heavy, damp soil.

Potato land should be carefully ploughed and thoroughly harrowed. If planted in drills they should be made about three feet apart and the seed dropped at intervals of one foot, but at this distance not over two stalks should be allowed to stand in a place. If planted in hills they should be two to two and a half feet each way. The seed should be covered quite deep, generally about three inches.

When the tops appear and can be easily traced, a cultivator should go over the field, between the rows, each way. This will destroy the weeds just growing and loosen the earth around the hills. When plants are sufficiently advanced, the process should be repeated, and finished up with a hand-hoe. The rows should not be hilled up much on dry ground, but more on damp or clayey.

Seed potatoes should be selected with care, of medium to large size, and from a not over-ripened crop. Potatoes that are not over-ripe contain more life and vitality than those left until the tops are entirely dead.

Cut seed should be used, for economy, if for no other reason. Two or three good stalks in each hill always yield much better potatoes than a larger number. The tendency of all potatoes is to fall back to their wild state, and only by carefully selecting seed can any variety be kept pure. Always use good potatoes for seed. Put in each hill two pieces each with a single eye, or if in drills, one piece at each interval. Cut with a sharp knife and handle carefully. There is always danger of over-seeding, and seldom of using too little. Over-seeding is certain to produce a larger proportion of small potatoes, while light seeding yields less in number, but much larger and nicer.

Wm. J. Rotch, *Chairman.*

VEGETABLES.

ESSEX.

From the Report of the Committee.

Vegetables.—After some discussion as to the meaning of the paragraph which accompanies the list of premiums, and which reads, "No competitor for premiums to exhibit either more or less number of specimens of any vegetable than the premiums are offered for," its meaning was clearly understood. It seemed to be more the province of the superintendent to enforce this rule, than of your Committee.

A number of competitors had displayed more specimens than are required, while others had shown too few. In the former case the competitors would have made an equally worthy show, had they selected the requisite number of the best specimens, and they would thus have prevented all chance of overcrowding the tent, and enabled the visitors to go away better instructed, and without having been deceived by inferior specimens. To cite an example of the latter case, a sample of less than twenty-five ears of field corn appeared most favorably to your Committee, but they could give it no premium, and could give it only a gratuity.

The Committee believe the rule excellent, and, that it may be strictly adhered to, I would recommend that the superintendent of vegetables be instructed to see that only as many vegetables are placed on exhibition as will conform to the rule of the society above quoted.

Some exhibitors did not follow the rules of the society as to size and weight of vegetables, but premiums were in no case awarded contrary to your rules in this respect. It was our endeavor to award premiums to vegetables that were best suited to the purposes for which they are used, due regard being paid to the cost of cultivation.

The present manner of arranging the vegetables entered for premiums, can be greatly improved upon by adopting the plan which the Massachusetts Horticultural Society followed this year for the first time, and which has been generally pronounced most desirable by connoisseurs. That society no longer exhibits by collections, but by specimens, so as to have all mangolds together, all flat turnips together, etc., etc. Thus the committees can do their work most justly, and much more quickly. All specimens should be distinctly numbered with the exhibitor's number as contained in the list of entries; and no vegetable should have the owner's name attached until after all awards have been made.

The Committees, having the list of premiums, as contained in the printed "Order of Arrangements," and a sufficient number of premium and gratuity cards, then begin their work. They see before them, in examining, for example, the mangolds, all that have been entered, without having to wander all about the tent to find them; and they can at once examine and place the premium card where it belongs, at the same time making a note of the number attached to the specimen, for future guidance. So on till all the awards have been made.

The owners' names have not yet been known by the committees, so that no one can have the chance of saying that any partiality has been shown. It is now the time when the superintendent of the hall should be instructed to give the chairman of the committee the book which contains a list of exhibitors, with their number prefixed to their names, and a complete list of the articles each exhibits, following his name. Then let the chairman write on each premium card the exhibitor's name and the name of specimen for which the award was made.

It would be well to provide cards twelve inches long by three and a half inches wide, on each side of which should be printed the name of every vegetable for which premiums are offered; these to be placed in a slit, made in the end of a round stick, one-half an inch thick, and the whole supported on a round base one inch thick and five or six inches in diameter. If these are placed near what they represent, and the card at right angles to the length of the tables, we shall have given to our visitors the means of ascertaining at a glance, up or down the tables, where everything is. This plan would also be especially good, if used in the display of fruit, which is always fine at our shows, and would be the means, among both vegetables and fruit, of acquiring for our exhibitors even more credit than they can possibly derive at present. These opinions are most respectfully submitted by the Chairman of this Committee, and are based, not only upon his experience and observation in serving at our last show, with a number of gentlemen most admirably qualified for the place, but also from what he has seen at many other shows in this country and in Europe.

The Massachusetts Horticultural Society had not concluded to fully adopt this plan until this centennial year; why cannot we begin the new century by adopting it before our next show?

Francis H. Appleton, *Chairman.*

Statement of Hayden A. Merrill.

The piece of cabbage which I enter for premium, was on broken up sod, and was planted about the first of June with Fottler's Brunswick, with the exception of about one-fourth part, which was set out with plants of the same variety, which I procured of one of my neighbors.

I used two cords of compost in the hill. The compost consisted of one-half muck, the balance being horse and cow manure, night soil, fish waste, sea manure, with about 175 pounds of muriate of potash, the whole being well mixed and fermented. The cost of the compost could not, to the best of my calculations, have been over six dollars a cord. And the same estimate would apply to the squashes, with the exception of the cost of the potash.

I have marketed only one hundred and fifty of the cabbages, they bringing eight cents each. They were sold two weeks ago, and would probably at this time have brought from $10 to $12 per hundred.

I have counted the heads, and find 1,200 that would sell for about $10 per hundred (the average weight of which was sixteen pounds, four hundred that would sell for about $5 per hundred, one hundred that would sell for about $2 per hundred, and a few that would not be marketable, they being hills that, owing to the dry weather, had to be set out twice, and did not therefore have time to mature.

The piece was measured by Mr. Appleton, and, according to the certificate, measured one-half acre.

Cost of Raising Cabbages.

To ploughing and preparing land,	$4 00
sowing seed and setting plants,	3 00
cost of seed,	1 25
cost of manure,	17 25
hoeing twice,	5 00
cost of marketing, and estimated cost of marketing the rest,	24 00
Total,	$54 50

Value of Crop.

To 150 heads, at 8 cents per head,	$12 00
1,050 " at 11 " "	115 50
400 " at 5 " "	20 00
100 " at 2 " "	2 00
fodder,	12 00
Value of crop,	$161 50
Cost of raising,	54 50
Net profit,	$107 00

SQUASHES.—The piece of squashes, according to statement of H. A. Appleton, sworn surveyor, measures ninety-five rods. On this I have grown seven tons of marrow squashes, which, with the exception of one-half ton, have been fine, marketable squashes. I sold the earlier squashes, about two tons, at $1.50 and $1.25 per cwt. Then sold at $1 about one and one-half tons. The remaining three tons were sold at $15 per ton. The remaining one-half ton was sold at less price, and fed out to the cows.

I used four cords of compost, spreading on and harrowing in with Randall's harrow, three cords, and putting the remainder in the hill. The compost consisted of one-half muck, with the balance made up of horse and cow manure, night soil, and a small amount of fish waste. It was well thrown over and pulverized. The land has been up for several seasons, and was a very dry piece. The latter fact, considering the dry season, was against the raising of a larger crop.

Cost of Raising Squashes.

To ploughing and preparing land,	$6 00
sowing seed,	50
cost of seed,	2 00
value of manure,	24 00
hoeing twice,	5 00
harvesting and marketing,	25 00
Total,	$62 50

Amount of Crop.

Two tons, at $37.50 per ton,	$75 00
One and one-half tons, at $20 per ton,	30 00
Three tons, at $15 per ton,	45 00
One-half ton, at $10 per ton,	5 00
Value of crop,	$155 00
Cost of raising,	62 50
Net profit,	$92 50

Statement of Daniel Carleton.

ONIONS.—The half-acre on which my onions grew was divided into two pieces by your committee,—one piece of forty-one rods, and one of thirty-nine rods. On the first piece, the crop of 1874 was onions. Barn-cellar manure, at the rate of about twenty-five loads, and Cumberland superphosphate, at the rate of half a ton per acre, were used. On the second piece the crop and manure for 1874 were the same as on the first. In 1875, the crop on both sides was onions; the first piece was manured with Cumberland superphosphate alone, at about twelve hundred pounds per acre. The second piece was manured with barn-cellar manure alone, at about thirty loads per acre. For the crop of 1876, the first piece was manured with about twenty-five loads of thirty bushels each per acre, being a compost of meadow muck, and cattle, horse and hog manure, ploughed in, in the fall of 1875. The yield on this piece was 158 bushels and a fraction over.

For 1876, the second piece was manured with Cumberland superphosphate alone, at about fifteen hundred pounds per acre, applied just before sowing the seed, and raked in. The yield on this piece was 136 bushels.

The soil of both these pieces is a dark, strong loam, with a rocky subsoil. The land was ploughed once in the fall of 1875, and twice this spring, at the last time ploughing six furrows at a time, and then raking level with a common hay-rake. The seed was sown on the eighth day of May, with Matthews' seed-drill, in rows fourteen inches apart, using four and a half pounds of the yellow Danvers seed per acre. The crop where the superphosphate was used ripened the earliest. Where the manure was used, the onions had been just pulled when viewed by your committee, and then looked rather green, but they all dried off, so that they were housed before the close of September. The onions were harvested by pulling them by hand, and throwing three rows together, and letting them lie a few days; then turned by raking six rows together, and, when thoroughly dry, carted to the barn, where they were topped, and every basket of onions weighed, allowing fifty-two pounds per bushel. The yield of the crop was somewhat affected by the ravages of the maggot.

The onions, however, were very sound and hard, and of good size, there being but few small ones, and scarcely any scullions.

The cost of raising crop on the half-acre was as follows, viz. :—

Cost of Crop.

To ploughing and preparing land,	$9 00
sowing seed,	1 00
cost of seed,	3 50
superphosphate,	8 50
value of manure on the land,	16 00
weeding five times,	25 00
harvesting,	20 00
Total,	$83 00
Amount of crop, 294 bushels, at 75 cents,	220 50
Net profit,	$137 50

HAMPSHIRE, FRANKLIN, AND HAMPDEN.

From the Report of the Committee.

VEGETABLES.—The methods and practices of our New England farming, for the last ten years, have developed many radical changes, which, in our view, must result most disastrously to the farming interest, unless some radical cure springs up to offset it. It is patent to all, that we grow less beef, less mutton, and less pork, every year. Why? The farmers say they cannot afford it. Can they afford to put all their earnings into the butcher's cart, to send West every year, and let their pastures lie idle? Is it better economy, in the long run, to get nothing for the use of their scant pastures, than to take three per cent. where they were used to gaining six or more per cent.? Is it better to buy Western corn at seventy cents, and earn the money to pay for it in some other direction or pursuit, letting their lands lie idle, than to raise it at seventy-five or eighty cents even? These are only small items compared with the whole. Step into one of our grocery stores, and look over the shelves, and what do you find? Canned fruit, canned vegetables, canned fish, canned meats; in fact, almost all varieties of food canned for the table. Look farther, and you will find most of them are canned West or South. Temptingly put up, with handsome labels outside, toothsome food inside. The farmers buy because it is cheaper than to raise. The word "cheap" has a more potent effect on the times than any Presidential election. What is the remedy? If we cannot grow the meat, we must have more and better vegetables. In our exhibition, there was a noticeable absence of two very important vegetables, the pea and the tomato. In years past, some English and Scotch gardeners have been experimenting in the growth of the pea, with marvellous success. Varieties have been produced that should never be absent from the daily board of the farmer's meals. The tomato is equally as good, in its way. It won't stick to one's ribs (as the Irish say of the parsnip and the cabbage). For all that, it, like the pickle or preserve, is a toothsome condiment. The onion, also, in many farmers' families, is considered more a luxury than a useful vegetable.

If we are to regard the opinions of eminent physicians, the onion is a great corrective and alterative of the human system, when freely consumed, and is a preventive, as well as remedy, for some affections of the kidneys, that are becoming so alarmingly frequent among our active men of middle life. The same influence upon the liver is attributed to the free use of the tomato. Equally effective is the celery plant upon the nervous system.

But outside of any medicinal virtues which our common vegetables may have, nearly all of which have been perverted by quacks and nostrum venders to strange uses, the great questions of food and economy are the ones which come nearest home. It is of no use to talk of the heart and the moral sense until the stomach is right. To have that right, it must be well filled. If the farmers of New England, and particularly those within the limits of this society, are short of money, short of beef and pork, and cannot see their way clear to grow more of those articles on their farms, they must eat more and better vegetables. The list is large, succulent and healthy. Judging from the specimens before us, they can be grown successfully, not only for summer, but for winter consumption; and let our wives and daughters wear one less plaited flounce, and devote a little time to preparing them for winter use in the family. It is pleasant to talk about the dignity of labor. It is pleasant to think of removing the drudgery of work. It is pleasant to know that farmers, and their wives and daughters, can go to the Springs; or the sea-side. Pick out and set aside all who are actually *able* to do so, and a large, very large number *cannot* do so. We must stay at home and work, work or starve. We have so burdened ourselves with business and superfluities, that a goodly portion of our vital forces are expended in taking care of things, instead of procuring food and raiment. We repeat, then, *we must work*. We might as well accept the situation and, when spring opens, begin at the garden, and let our tables groan, if need be, with the fulness thereof.

A. P. PECK, *Chairman*.

PLYMOUTH.

From the Report of the Committee.

Too many farmers act on the principle that nature is not to be trusted, and manure too lightly. Deep and careful culture, with heavy manuring, will pay better than any other system, and once having been adopted, no other will be followed. The reasons are obvious. The work in cultivating is not much greater when you raise sixty bushels of corn to the acre, than when the yield is thirty bushels. You will remember the story of the man that continually divided his estate every time he gave a daughter in marriage, until he had disposed of more than half a dozen, yet he still prospered, and raised better crops than at first. This lesson has not been lost on English farmers, when the amount invested in fertilizers, machines and tools equals the value of the farm. In a highly manured soil, insects injurious to vegetation cannot thrive in their mischievous work, as in the unfertile land of the careless cultivator. The vigorous plants, with rapidly forming cells, many times push away and destroy the work of insects when growing in a generous soil. If the soil is poor and thin, this result is not to be expected, and is rarely seen. I except the ravages of the Colorado beetle, which, if hungry, might eat wood. It is a question for us to solve as to how many acres of this Plymouth County soil it is desirable for farmers to cultivate. I have no doubt that as a rule farmers have too much land. There is too much silex in Plymouth County for the best results. Clay is not only needed, but is an absolute requisite to success. Harris Lewis of New York, stated in an address before the Massachusetts Board of Agriculture about two years ago, that when he was destitute of manure, in some cases he irrigated the fields with muddy water; *i. e.*, he mixed soil and water together, and then applied it to his land. One or two applications he considered would give a good crop of grass. This statement seemed to me a remarkable one when I heard it, as I thought that in Plymouth County two-thirds of the soil would hardly color the water when mixed. But the soil of which Mr. Harris speaks is largely made up of clay, and when diluted with water, and charged with the fertilizing properties of the atmosphere, is absolutely, to a certain extent, liquid manure. Now I wish the farmers of Plymouth County to remember, those of you at least who own light land, that a good coat of clay, say one inch in depth, will give it a strength or body, and power for crops that nothing else will. It is stated—and doubtless with truth—that in one ton of good manure all the fertilizing elements are contained in less than one hundred pounds. Consequently, it has been assumed that the other nineteen hundred pounds are comparatively useless, and are a burden to be lifted and carted over the farm, using time and labor to no purpose. The answer may be to this, that while the theory may be correct, with our present knowledge, one hundred pounds of concentrated fertilizer will not do the work of crop stimulation and encourage plant-growth to the same extent that one ton of the best manure will. Hence, all available sources of supply must be sought out, and then, and not until then, put out your money for special manures. But do not forget the clay for your kitchen-garden, and then if you are satisfied that it pays, the same application can be made to your fields. It is not an extravagant statement to say that a garden, in the best condition, will produce three times as much per square rod as one in the average condition. Is it not a remarkable fact that farmers, while recognizing, to some extent, this fact, by the more liberal care and manuring given the garden, should have in so few instances carried the principle into field culture? A kitchen-garden, well kept, is a blessing to the whole family, physically and æsthetically, and I might also add, pecuniarily.

To be well, we must eat vegetables to some extent, and tender, succulent ones are always to be preferred to those stringy and woody fibered often raised as well as purchased. If farmers wish the same results that market-gardeners expect and get, they must imitate them by deep culture and liberal manuring; and then—and I fear not till then—will our exhibition in this department be what it ought. A kitchen-garden is better with a southern exposure, and if it is just a little sloping it improves it. No trees or shrubs should be tolerated in the vicinity. It should be spaded or ploughed to the depth of not less than twelve or fifteen inches, two feet would be better, but it *must be* well drained in order to give early crops. If sloping, it would probably be naturally drained, but in a flat or level section, unless attended to, the best results must not be expected. The amount of manure to be used will be indicated to some extent by the kind of vegetable cultivated. A garden may be too rich in fertilizing elements for some vegetables, but, as a rule, the more manure used the larger the yield, and corresponding satisfaction to the owner.

LORING W. PUFFER, *Chairman.*

NANTUCKET.

From the Report of the Committee.

VEGETABLES.—The raising of vegetables requires so much intelligence, skill, and large experience, that many fail in their attempts. There are departments in agriculture, whose treatment would fill many volumes, and yet leave much unsaid; such is the subject of manures. Their various kinds and the cheapest way of securing them, the best method of application, the condition of the soil calling for several varieties, the succession of crops as connected with nutritive ingredients present in the soil, or already taken from it, the precise effects of different kinds of manures, and the circumstances under which they finally exhaust the soil, are themes for profound philosophy and research. There is not a single crop which does not suggest curious and practical inquiries as to the variety of seed to be chosen, its method of selection, the condition of the soil, and the details of cultivating the plant.

The soil with which the farmer deals is more like a living than a dead agent. It is found that plants feed with the same daintiness, and require the same skill of preparation in their food, as animals. The effect of thorough pulverization, of air, of moisture, of length of time, and the form in which manures have lain in the ground, are to be considered, and render it impossible to apply a chemical theory without testing it practically at every step. While rules greatly aid us, they must fall into intelligent hands to be entirely successful; they cannot travel from farm to farm, from field to field, without modification. Thus agriculture remains an art as well as a science. The law of agricultural labor, as contrasted with manufactures and mechanical labor, differs; this class of labor should be concentrated, rather than scattered; gathered into a few acres, rather than spread over many. Don't till more land than your capital and labor will enable you to produce, under favorable circumstances, a maximum crop. As the farmer increases the ground under cultivation beyond a fixed standard for the best of cultivation, every step is attended with reduced profit. Many till four hundred acres with labor and means not more than sufficient for one hundred; and one hundred acres with means suited to twenty-five. Hence, if we are told that an income of one thousand dollars was obtained from one acre of land, we should feel quite sure that a large part was profit, perhaps sixty or eighty per cent. If told that a similar revenue was obtained from ten acres, we should be certain that the profits had fallen to twenty-five per cent.; and if we were again informed that such an income was realized from one hundred acres, that the labor must absorb nearly the whole, and the profits sink to four or five per cent. The quantity of land to be tilled must ever be limited by the amount of labor and capital, to realize the greatest return from highest manuring and most thorough tillage, regardless of expense. Why cultivate four acres to obtain the same amount of vegetables that can be produced from one?

It has been found from experience that the tissues of plants absorb, and take into their growth, the finest and most dissoluble portions of manure; hence the finest and most dissoluble are the best fertilizers. Finely pulverized, and those in a liquid form, contain a much larger percentage of nutriment, and it would compensate the farmer for the labor and expense of reducing all his manures to that condition.

The earth is like a pair of lungs, requiring to be kept open, so that the air may circulate freely through them, which is most essential to a healthy condition of the body which they support. Like the surface of the body, it has pores through which air, light, and heat enter, to warm and nourish the plant rootlets below. In order to have a good, open, well-pulverized, friable, and nutritious soil, which is especially needed in severe droughts, nothing is more desirable than thorough and careful ploughing. The deeper the soil the more plant-food, and the lower the roots penetrate. To obtain a steady and quick vegetation the ground should be pulverized to a depth sufficient to accommodate any length of root the plant may grow under any circumstances. The more room provided, and the lower the water stratum is rendered, the greater number of roots will grow. The depth of the water stratum determines the length of plant roots; they will never penetrate below this, but will continue stretching down until they reach it, if it is three feet from the surface. If they are allowed to descend only six or eight inches, the quantity of root will be too small for the upper portions of the plant; but if they are unlimited, they will, other things being equal, be capable of sustaining the plant at almost any time; for this, the increased root augments the quantity of moisture taken up, and sustains it under the sun's heat. Deep ploughing has never been justly appreciated, and is a matter that claims the attention of all farmers, who should use every means of working against severe droughts.

The cultivator and the hoe are also effective implements for pulverizing and stirring the soil. Especially are these methods of culture beneficial, if the soil is inclined to bake or crust, as it very often does in severe droughts. Science, with practice, must be the motto in raising good vegetable crops. The advice of the old painter to his pupil, to "mix brains with his colors," is equally applicable to the gardener, the vegetable producer, "mix brains with the soil." Do nothing vaguely or indefinitely; calculate closely, exactly, and determine the result of every step, and success will attend the labor.

Albert C. Bartlett, *Chairman.*

MANURES.

ESSEX.

From the Report of the Committee.

The successful prosecution of agriculture lies in a knowledge and supply of those ingredients to the soil which are found, by oft-repeated experiments, to be most conducive to the full development of cultivated plants.

The discoveries of chemistry show that all plants are built up of organic and inorganic materials. Their organic part consists of about nine-tenths of their weight, or that part which can be consumed by fire, and the inorganic that which remains in the ash.

Their organic elements are derived from the atmosphere; viz., carbon, oxygen, hydrogen, and nitrogen. Over these man has no control, for when the present harvest is consumed, or decays, these elements, without loss, return to the atmosphere, and are laid up for future use. Hence it is seen, that in the divine economy the same materials are worked over and over again, in the annual harvests forever.

But it is the inorganic elements of plants with which the cultivator has to deal, and over which he has control; for the living plant draws from the dead earth those materials which are indispensable to its healthy growth.

If, therefore, certain plants require in their growth, potash, soda, lime, sulphuric acid, or any other inorganic constituent, and the farmer repeatedly raises the same crops upon the same ground, without returning the inorganic matter which he removes in each successive harvest, it is obvious that his crops must diminish from year to year, for it has been found that however small the inorganic matter which a plant requires, if it cannot be found in the soil, the plant sickens and dies.

Here is a striking instance of failure of grass upon a portion of a piece of peat meadow, which we reclaimed a few years since: the meadow was drained, the surface levelled, and in winter, when frozen, about one hundred ox-cart loads of gravel were hauled upon it to the acre. In the following summer, this was spread, covering what grass was growing. In the autumn, a compost was spread upon it, and grass-seed sown. The next summer the crop of hay was two and one-half tons to the acre.

The herdsgrass stood four feet upon a level upon the lot, with the exception of a small piece upon one end, on which no gravel was spread; upon this part of the meadow,—clear peat, with the exception of the compost,—the grass attained but half the height of the gravelled part, was very soft, and fell to the ground, for want of silex to give strength to the stem. It is thus seen that for the want of a single element of inorganic matter in the ground, the crop failed one-half.

There can be but little doubt that many of the cultivated fields of the county, which produce but a scanty crop without being enriched by stable or barn-yard manure, might be greatly improved, at a comparatively small expense, by the application of some inorganic element of manure (for any matter which makes land productive is manure), like lime, potash, soda, or any other inorganic element of plants, of which the soil has been robbed by long-continued cultivation.

There is ground which at sight looks as if it might be naturally productive, but which scarcely produces grass enough to form any sward. Here, perhaps, one or two simple elements of plant-growth are wanting, which, if supplied, might render the land productive.

It is hoped that cultivators the coming season will make careful experiments with the mineral preparations which are for sale, and which are said, in some instances, to double the crops.

J. Newhall, *Chairman.*

DAIRY STOCK.

ESSEX.

From the Report of the Committee.

No matter how good-looking the individual animals in a herd may be, it is their record which ought to govern the Committee more than anything else, in judging.

Statements in regard to keep and yield of cows are of comparatively little value, unless they enter into the details, as to the measure or weight of food, measure or weight of product, manner of preparing and kind of food, time of feeding, etc. Moreover, the time of calving should be always stated.

On such a basis as this, the record of two or more herds may be easily compared, and a fair judgment arrived at; but if loose statements and guesses are allowed, the comparative merits are not easily recognized, and the public are taught nothing which can be relied on.

We have always supposed that the object of this society was, on the one hand, by awarding premiums, to encourage the exhibitor; on the other, by publishing reports, to endeavor to instruct its members by giving trustworthy and valuable information. That both purposes may be accomplished more fully, the Committee recommend the alteration of the rule in regard to herds of milch cows, as follows:—

For the best herd of milch cows, not less than five in number, to be exhibited at the show, and a correct statement in writing of manner of keeping and yield for any successive six months between January 1 and September 20 of any year. Each cow must have been in milk at least three months. The statement must give every detail possible,—the measure or weight of grain or roots, an estimate of quantity or weight of hay, the measure or weight of product in milk or butter, manner of preparing and kind of food, hours of feeding, when last calf was dropped. The weight or measure of milk must be taken each week and stated in writing, then an average of the whole time may be given. An exact record of the daily yield of each cow would be preferred. First premium, $18 ; second premium, $12 ; third premium, $10.

An additional premium is also recommended. For the best herd of milch cows, not less than five in number, with statement as above, only extending over the period of one year. Each cow must have been in milk at least six months. First premium, $20 ; second premium, $15.

If we make a comparison between the two statements handed to the Committee, we find that Mr. Peabody enters more into the details of management, etc., gives the time when the last calf was dropped—a very important matter. His cows yielded 378 pounds of butter and 550 quarts of milk. Allowing 12 quarts of milk to one pound of butter, the whole yield in milk would be 5,086 quarts. Supposing the record of yield was made up to about September 20,—

Cow No. 1 would have been in milk	150 days.
" 2 " " "	160 "
" 3 " " "	125 "
" 4 " " "	128 "
" 5 " " "	180 "
Total,	743 days.

Reckoning 5,086 quarts as the yield of one cow for 743 days, we have an average of 6.84 quarts, or nearly seven quarts per day. For 365 days, or a year, the product would be 2,555 quarts, or 5,493.25 pounds,—a fair record. We must bear in mind, however, that this was not the yield of one individual cow ; but the concrete yield of five cows soon after calving.

Mr. Russell's foreman, Mr. Reynolds, stated verbally that three of his cows calved in January and two in June. Considering three cows to have been in milk 180 days, and two 90 days each, total 720 days, at his average of 11 quarts per day, would give a total yield of 7,920 quarts, or 17,028 pounds.

Since August 1, Mr. Reynolds fed two quarts of meal and four quarts of shorts, besides corn-fodder. Since August 1, Mr. Peabody fed four quarts of fine feed, besides corn-fodder.

Mr. Russell's cows' yield in milk far surpasses that of Mr. Peabody's, and reckoning 7,920 quarts as the yield of one cow for 720 days, or 4,015 quarts for 365 days, would be considered a very large record for one individual cow.

The Committee make this report, without entertaining the slightest ill-feeling toward the exhibitors, or any member of the society ; but simply for the reason that they consider the "rule" is not clear in its meaning, and, moreover, does not enter sufficiently into the details of management, etc., which are necessary for the enlightenment of the public, and also for the basis of a fair judgment.

The Committee hope that the trustees will, at least, take such action as will make the matter clearer than it is at present, for the benefit of future exhibitors and judges.

J. D. W. French, *Chairman.*

WORCESTER.

From the Report of the Committee on Heifers.

In view of the fact that the improvement of dairy stock is of vital importance to the success and prosperity of the New England farmer, and also when we remember that in localities like our own, and in *all* localities which are looked to by our great cities as the source from which must come their supply of milk and butter,—*it is*, we say, in *these* localities, that we find the finest herds of dairy cows in New England.

Not that these particular localities have *produced* the finest herds, but they have *procured* them,—they have *gleaned* them from the surrounding country,—*gleaned*, because from their superior location, from their convenience to a market, *they* could afford to offer a larger price than the owner could afford to refuse.

But what is the tendency of this course of procedure? As time passes on, these animals, so carefully selected, pass away one after another, and we find it necessary to fill their places with others. And we again look to the source from which they came, for other animals to fill their places; but as we look over the territory which we had before gleaned, do we find the progeny of these fine animals to select from? Not at all. These fine animals, of which we were justly proud, have passed away on our own dairy farms, together with their progeny, and we are left to glean from the progeny of the animals which we had culled and rejected before, and this only to be repeated as each animal shall fulfil its mission and pass away.

And here the question very naturally presents itself,—What is the remedy?

Your Committee would first mention some of the objections farmers make to raising stock: And first, they say it does not *pay*,—we can buy our cows cheaper than we can raise them. We want to economize our barn-room; a young heifer occupies as much standing-room in my barn as a milch cow, and although she may be improving in size, and increasing in value, a milch cow will pay better, and so we are content to look quietly on and see our dairy stock degenerate from year to year, congratulating ourselves with the gratifying thought that we have saved a few dollars on the first cost of each animal.

And now let us look to some of the reasons why we cannot afford to raise our own cows; and your Committee verily believe that the man who shall demonstrate that it will pay to raise dairy cows on our milk-producing farms, will be as great a benefactor to the farmer as the man who invented the mowing-machine or horse-rake.

The calf is generally taken from the cow when three or four days old, and if milk is bringing from five to seven cents per quart, it seems a waste to allow a calf to drink it; and so hay tea, milk and water, porridge, oatmeal, etc., is resorted to, to take the place of milk. The result is, as we ought naturally to expect: the calf, instead of thriving, drags out a miserable existence for the first six months of its life, and we find it at that time small of its age, poor, and perhaps more or less diseased, and in every way in an unfavorable condition to pass the first winter of its life, and with a flattering prospect of its taking the next two years and a half, at least, to develop an animal suitable for a milch cow; and yet there are farmers who, after stinting their animals for the first two years, if they *then* feed them so that they are in tolerable good flesh when they come into milk, at three years, they feel that they have produced them at the least possible cost, and yet they feel that it has not been a paying operation.

But now, suppose we were to try this over again, beginning, as it were, at the other end,—that is, feed them well on the start, and if we are to stint them at all, do it after they are two years old.

The younger the animal, the more care and attention it requires, and the more care and attention it gets, the faster it develops and matures. Not unfrequently, when noting an animal reared under these conditions, we hear the remark that "this yearling is large enough for a two-year-old,"—a statement which would be literally true, if the "two-year-old" were raised by the first-mentioned plan; and let us not forget just here, that if the cost of the first year is a little more, we produce the cow in two years, and make a saving of what a two-year-old animal would consume during one year; and what is still better; we have the satisfaction of feeling that it has been a paying operation.

THOMAS S. EATON, *Chairman.*

HAMPSHIRE, FRANKLIN, AND HAMPDEN.

Statement of Henry Shepherd.

The cow I offer for premium is high grade Devon, eight years old. I have owned her about a year, and she is the best of many cows I have owned. She calved last December; her calf, at six weeks old, weighed two hundred and forty pounds.

This cow was fed upon rowen hay the first five months, consuming, by actual weight, 225 pounds per week, or more than 2½ tons, at $20 per ton,	$50 00
And 20 bushels roots, potatoes, carrots, beets, etc.,	5 00
And has consumed about the same value in rowen hay, grass, cornstalks, apples, pumpkins, waste vegetables from the house, in the last five months, say	55 00
	$110 00

The cow has all the time been kept in the stable, has not eaten any grain or meal, which probably would not have cost more than the hay, and her product and profit increased.

The average quantity of milk per day during—

December and January,	was	16	quarts, milk measure,	992
February and March,	"	14	" "	840
April and May,	"	13	" "	793
June and July,	"	12	" "	732
August and September,	"	12	" "	732
Average number of quarts,				4,089

4,089 quarts, or 32 barrels of milk, at 6 cents per quart,	$245 34
Amount of profit, if all the milk had been sold, as most of it was, at 6 cents per quart,	135 34

Butter of best quality was occasionally made from the milk. I have taken care of this cow myself, and know the above statements are correct.

Statement of H. C. Haskell of Deerfield.

My grade Jersey cow, "Beauty," twelve years old, the second week after calving, produced twelve and three-fourths pounds of butter, and six months after produced twelve and a quarter pounds. The following is a copy of my record of sales of butter aside from all used in family, for a period of seven years, each cow counted as one in the herd, whether she be dry or in milk, and part of which were heifers which came in at two years of age :—

YEARS.	No. of Cows.	Average lbs. of Butter.	Average Receipt per Cow.
1866,	6	276	$140 40
1867,	6	305	135 90
1868,	6	287½	137 65
1869,	6	289	147 81
1870,	7	289	133 27
1871,	7	285	121 28
1872,	8	279	133 30

The above were all thoroughbred and grade Jerseys. Have not kept a record for the last four years, but think that the amount of butter is fully equal to the foregoing years, but the cash receipts have fallen somewhat.

I consider the following near the cost of keeping a cow for the year with me :—

Pasture, 28 weeks, at 75 cents per week,	$21 00
1¾ tons hay, at $20 per ton,	35 00
20 bushels corn, at 60 cents per bushel,	12 00
Total,	$68 00

DAIRY PRODUCTS.

WORCESTER.

From the Report of the Committee.

In making prime butter or cheese, it is absolutely necessary to have good milk. Cows fed on cold, sour grass, noxious weeds, or coarse bog hay, and having impure or stagnant water to drink, will produce a quality of milk that will make a very poor quality of butter or cheese ; therefore, the cows should have sweet, nutritious food, pure water to drink, and pure air ; where there are bad odors in pastures, such as carrion, it has been known to affect the milk, so that it very essentially affected the cheese that was made from it. Therefore, it is requisite to have perfect cleanliness in butter and cheese making. There should be cleanliness in the pasture, in the stable, and in milking ; and all utensils used about the dairy should receive great care, as I have known a small can of sour or decomposed milk to taint a large vat of milk so that it would nearly spoil the cheese. The situation of the milk-room for making butter, when milk is set in pans, is of importance ; a northerly aspect, where the air is pure and not exposed to the odors of stagnant waters, cow-yards, pig-sties, or any impurity from vegetables, cellars, or drains about the house, is very desirable. The milk-room should be kept at a temperature of about 55 or 60° F., and equalized by steam-pipes, hot-air, or stoves, with ventilation to give an equal circulation of air. The warm part of the season the milk may be cooled by running spring or ice water around the pans or vats, or by placing tubs of ice in the room to keep the temperature about 60°. The cream should be about 60° F. when put into the churn; the churning should be done with care, the stroke should not be too quick, but uniform. When the cream first shows signs of butter, the sides of the churn should be freed from adhering cream, so as to be mixed with the other. If the butter appears soft, add cold water to make it more firm; when the buttermilk is drawn off, rinse the butter with cold water, and draw it off immediately. Great care should be exercised in working the butter, or the grain will be destroyed. I think I saw one such lot on exhibition last year.

Most of the butter made now is worked with a butter-worker. When butter is packed for the market, or to keep over the season, it should be put into either cedar, oak, or ash tubs, or stone jars, and pressed in solid, and a fine cloth cut to fit the top of the jar or tub, and placed smoothly on the top of the butter, and that covered with a layer of salt so as to exclude the air. Though cheese requires the air, butter should be closely covered, that it may not become air-slaked, or lose its nutty taste, or absorb bad odors.

J. W. Powers, *Chairman.*

HORSES.

WORCESTER.

From the Report of the Committee on Brood Mares.

Horse-breeding as a pursuit, in New England, is usually pronounced a failure. It is held not to pay, in a money point of view; and the stock bred has not been, of late years, a credit to the breeders. The reasons for this lack of success seem to be,—want of knowledge of the business, and misdirection of energy. Breeders have groped in the dark, with no standard of excellence, knowing no law of selection. Instead of breeding with a clearly defined purpose, a horse for cart, or saddle, or carriage, a quick-maturing, well-sized, fine-tempered animal, "a farmer's colt, and a rich man's horse," they have had vague dreams of Dexters and Goldsmith Maids to be got by breeding worn-out and usually unsound mares to horses with a track record, or often to horses only related in blood to some that have had track records. Is it strange that such ill-founded expectations have ended in disappointment and disgust?

Such has not always been the story of New England horse-breeding.

We had, in the last generation, a family of horses of wide renown for beauty of form, docility of temper, high courage and endurance. The Morgan family not only brought money but also honor to the farmers of Vermont. These excellent horses were, according to their various grades, light carriage-horses, elegant, good-sized coach-horses, and the best stock for rapid draught, that ever bore a resolute and nervous shoulder against the collar.

In the later days of stage-coaching, the various Eastern lines were horsed from this admirable family.

In 1837, during the Canadian Rebellion, the First Dragoon Guards came out from England dismounted; horses for them were bought in Vermont, and also for the artillery. They were carefully selected Morgans, and the officers declared that they were equal to the best English troop horses. Until about 1858, the express companies in Boston and New York were supplied with Morgan horses of superb quality. These horses were of a type well remembered by horsemen,—high crests, thin withers, well set, lean heads, short backs, round barrels, clean legs, with powerful hocks, good feet and steady tempers. Farmers bred them with certainty. There was no money wasted in track-handling, and the colts were not hammered to pieces to show speed when their constitutions were half-formed. Everybody wanted such horses then, as they do now, and they put money into the farmers' purses.

Breeding in-and-in, selling the best and largest of the mares, and failure to replenish the fountain of thorough-blood, from which the race sprung, were the causes of their decline, so that to-day the name of Morgan has no spell to conjure with; nor has the family an existence, except in the fervid imagination of some stallion owners.

Of late years, the only idea of the breeder has been to get "a fast trotter." All other virtues have been overlooked. Failing to strike upon this accidental quality, he has been left with a "scrub," upon whose "handling" twice the value of a good horse has perhaps been spent.

We are thus overrun with trotters that cannot trot; or if they have been forced up to a factitious speed, they have not blood enough to "stay," and must be put into the category of failures. While we are thus supplied with what no one wants, never was there such a scarcity of fine coach-horses as now. A dealer looking for matched horses, a well-made, fast-walking saddle-horse, a powerful, quick horse for a coupé or T cart, or horses used for park tandems, or the class of high-bred animals able to take a heavy four-in-hand coach from Madison Square to Jerome Park, might search New England in vain for them. At the same time he could buy droves of light-muscled, coarse-headed, flat-ribbed, round-legged creatures, whose puffs and sprung knees tell of the vain attempts that have been made to "develop speed" for a mile. Failing in this, they have no quality that fits them for genteel service.

If the cost of trotter-breeding was merely for the fee of the sire, the time of a mare and the keeping of a colt, it might be repaid, even by the services of a brute fit for a horse-car or cheap livery; but the cost of breeding is only the vestibule of this temple of expense. Each of these animals has been "handled for speed." One season in the hands of a professional horse-puller, with all the expense of sulkies, blankets, sponges, toe-weights, boots, constant changing of shoeing, etc., will take the cost of a trotter up to a figure that he will never realize in the prosaic form of a mere horse.

Even when the best mares have been bred to the luckiest cross of stallions, it is conceded by thoughtful horsemen that the chance of record speed is as one to a hundred; so that in the hap-hazard method, it is a bucket of water to the broad Atlantic. But if the exceptional low-bred horse develops speed that survives training; if his feet withstand the ignorant shoeing that contracts the hoof, and his muscles bear the hammering that commonly puffs them, and his joints do not stiffen from sweats and over-working, there is another trouble that confronts us,—the change in the times has so reduced the finances of the average trotter-buyer, that there is no market for the colt when his owner is ready to sell.

In proof of this, one need only refer to the sales at auction of trotting stock, during the year past, and to the fact that city boarding stables have been full of horses, unfit for heavy work, that have been abandoned for their board bills.

If a man breeds from curiosity, or to gratify a whim, and can afford the expense, he has a right to do so. To this class we would not venture to offer advice. But to the farmer we may say that horse-breeding is a safe, easy, and legitimate branch of his business.

Colts are not more liable to accident than horned stock, and they are not so subject to disease. They are raised as cheaply in respect to food, and they do not require more room. It is easy to handle and teach them. Well-bred colts mature early, and at two years of age should pay their way with the light work of the farm. The French breeders of the Percherons make them earn their living at eighteen months of age.

The writer has seen three-year-old thoroughbreds ploughing as merrily as they afterwards ran races; and at Waterloo, the

Duke of Wellington rode a three-year-old colt, "Copenhagen," all day,—till Blucher, night, and victory came. Blood shows in nothing so much as in early maturity. Mares should not be too old, nor worn out with hard work. They must be sound, good feeders, and with room enough to carry a foal, and they do better if carefully worked until very near the time of foaling.

High breeding, good size, not less than fifteen hands three inches, with beauty of form and docility of temper, must invariably be had in the sire. Like produces like. The Arabs claim that the foal follows the sire, and there is a great deal of argument to be adduced in support of that theory, though the writer knows that a good mare must be had also.

Size, color, beauty of form and temper, can be bred with almost absolute certainty, and these qualities secured, a profitable colt is the invariable result. Nor is there any mystery about the business, as many writers and amateur horsemen are fond of asserting that there is. Any man who is fit to be a farmer, can raise a horse and handle him. If he breeds a proper mare to a proper sire, he can readily get a good, salable animal, and secure as great a percentage of profit as he expects from any of the commoner avocations of his business.

John E. Russell, *Chairman.*

POULTRY.

NANTUCKET.

From the Report of the Committee.

Poultry.—We would suggest the propriety of breeding only choice fowls until every valuable species be introduced into our county. It costs just as much to raise common fowl as pure breeds that are adapted to our situations, and the returns, both in eggs and poultry, are greatly in favor of the latter. The first consideration, with regard to breeds, is whether eggs only are the chief object, or poultry, or eggs and poultry combined. The intelligent breeding of poultry is, we are convinced, of far greater utility than many are disposed at first to concede. It has been said, and with much truth, that "Massachusetts beats the world in poultry." The skill and nice power of observation which is requisite in a successful poultry fancier, must be invaluable when applied in the direction of other live-stock. The same habits of careful and attentive observation of the points and strains, of color, form, size and production of one class, obtains, as in the other. All breeding is done by this sagacity and keen observation. The highest authorities recommend the "Standard of Excellence" as the best work on the points of poultry.

Leghorns, Hamburgs, Houdans and Plymouth Rocks are recommended as the most desirable laying fowls. If layers and large size are desirable combined, light and dark Brahmas and Buff Cochins are ranked first, the latter very remarkable for size and weight.

Poultry-yards should be dry, gravelly soil. Cleanliness and ventilation are most indispensable requisites in roosting-houses. They should be warm in winter and cool in summer, and can be so rendered by having glass sashes on three sides of the main room, making it so warm by the sun's heat during the bleak days of winter that scarcely any ice will be formed for the season. Where it is practicable, a cellar three or four feet in depth will cause a warmer temperature in winter and a cooler in summer. These sashes can be opened when desirable, and the roost aired and cooled.

After three or four years the old hens should be replaced by pullets for laying. The old adage is truthful, "Young hens for eggs and old hens for chickens." The same rule holds good with regard to breeding poultry that does with our thorough-breeding cows and horses. Thorough-breeding is simply breeding with such care and attention that all succeeding progeny shall be improved, perfect types. It can be done in any herd of native cows, by selecting a well-known cow, of excellent parentage and qualities, and breeding from her and her offspring, rejecting all unlikely ones. In twenty years a thoroughbred herd can be produced, which, if not equal to Jersey or Ayrshire, will be an excellent one.

The same rule with fowls. Select hens of superior qualities, and raise none but the finest; and an excellent thoroughbred flock can be had. Thoroughbred fowls are distinguished for marked qualities. Some are superior layers, like the Hamburgs or Bolton Greys, but very delicate. These can be improved by crossing with more hardy stock, and produce a desirable combination. In raising poultry don't do anything indifferently; there is too much farming and stock-raising done in our country without thought or calculation of the results, without system or design. Calculate, figure, mark down a programme, count the cost of everything, if you desire gains in any enterprise. There is no department of rural economy, if rightly managed, which will pay a higher percentage on the investment than poultry. The consumption of eggs is increasing slowly but surely in our country. Take, for instance, the New York market, the great business centre of the country. In New York City alone, the sale of eggs—

In 1870,	was	19,900,700	dozen,	which, at wholesale prices, would amount to . .	$4,928,919	20
1871,	"	25,912,210	"	amounting to . . .	5,661,973	85
1872,	"	28,360,410	"	amounting to . . .	6,292,250	27
1873,	"	31,148,070	"	amounting to . . .	6,976,603	35

These statistics show an increase of nearly fifty per cent. in three years.

The kind of poultry one keeps is fast getting to be the index of his intelligence, general culture and taste. The farmhouse that is without them lacks one of the most essential elements of rural beauty and comfort. Multiply the objects of interest on a farm, crowd it with all the beauty you can, whether of flower, shrub, bird or beast, and the investment will pay in added enjoyment, especially to the young. In the language of Dickens, "The wings of our agricultural enjoyments should never be permitted to moult a feather." The cultivation of a taste for choice poultry will develop one for other blooded stock, from which alone certain results can be obtained.

Fancy poultry, like thoroughbred stock-raising, or fancy farming, has its grand purpose, to divert those who have means, from too close attention to the counting-room and the warehouse, to the free and pleasing occupation of experimental farming, with its variety of pursuits, and its healthful and sanitary relaxation.

ALEXANDER MACY, JR., *Chairman.*

BREAD.

MARTHA'S VINEYARD.

From the Report of the Committee.

Bread is the most important article of our food. The term bread is sometimes used to express all of our food. God said to Adam, "In the sweat of thy face shalt thou eat bread."

The invention and manufacture of bread are of very ancient date. The Chaldeans and Egyptians practised the art of breadmaking, and at a later period the Hebrews found it essential not only for food, but the priests were commanded to offer it at their sacrifices. They had various methods of making their bread. They took "wheaten flour tempered with oil, kneaded it," and baked quickly, on the coals or under the warm ashes. This primitive mode of cooking bread is still practised among the Arabs. This bread, we may suppose, was the unleavened bread which was so often used.

At the feast of the passover the children of Israel were commanded thus: "Seven days shall ye eat unleavened bread. Seven days shall there be no leaven found in your houses." For the sacrifice of thanksgiving it was commanded to offer leavened bread; this leaven was probably similar to the yeast-cakes in present use.

There has been, perhaps, no time when so much thought and attention has been given to the bread question by scientists and medical men as at the present time. Agriculturists feel the importance of it, and for that reason offer generous premiums and awards, hoping to stimulate wives and daughters to renewed efforts at improvement in making sweet, wholesome bread, which is the reasonable and desired result of the improved wheat crops and milling, derived from earnest thought and hard labor.

"Dyspepsia is our national curse. It is the source of the greatest suffering and the greatest weaknesses of the American people, and it is generally conceded that among the factors of our national diseases none is so important and none so universal as the bad quality of our national bread."

We cannot expect or hope that great improvement will be made in the essential art of making wholesome bread, unless the ignorance and failures are exposed, equally with the success and knowledge gained by careful experiment.

From the many specimens before us we perceive that there is a commendable ambition among the ladies of Dukes County to excel in making bread. The greater part of it is delicious; some of it a failure, owing, not to lack of labor or a desire to excel, but to lack of knowledge gained by practical information. The loaves of brown bread and of corn-bread were well made and baked, with a few exceptions. There were several loaves of very good bread without the statement of the manner of making it, or the name of the maker.

Bread made from wheat is more desirable than bread made from any other grain, because the proportions and character of its constituent parts are better suited for food, for brain and muscle. The chief constituents are gluten and starch, gluten belonging to the muscle-forming group, starch to the fat-formers. Flour with the most gluten is most economical and sweetest. It is quite a matter of importance to be able to judge of its richness in gluten. There is a marked difference between the nourishing qualities of flour from Southern and Northern wheat.

The Report of the Patent Office for 1848 states that the Alabama flour yielded twenty per cent. more bread than flour from Cincinnati. It is said that the gluten of Southern wheat does not, to so great an extent as in Northern wheat, reside in a crust around the surface of the grain, but is more enclosed in the starch in the centre; this may account for the superior richness of Southern flour.

There are at the present day many experiments in flour-making. The "attrition flour" made in Chicago is obtained from the best quality of wheat. The flouring of the wheat is done at one operation, in large and powerful currents of cold air, and no bolt is used to separate the outside covering of the berry, in which reside the rich nitrogenous and phosphatic principles. This flour is several shades darker than that in common use, and notwithstanding its superior richness, it cannot be a favorite.

It is said that French bread is much better than American bread. English bread is no better than ours; but German bread is very superior, owing largely to the superiority of their wheat, although the proprietor of the Vienna Bakery declares that the bread which he now makes from the "new process" flour from Minnesota is as good as any in Germany.

Aside from the influence of the wheat and the flour, the great difference in the bread rests with the maker of it.

There is no better bread than that made with fresh hop-yeast, and none so wholesome or inexpensive.

If the bread is rightly made it needs neither shortening nor soda. A barrel of flour made into bread with soda and cream of tartar, or with Hosford's yeast-powders, has an additional cost of twenty-five cents to every twenty-five pounds of flour, besides the butter or lard which must be used to make the bread palatable. This is no small item in the cost of bread. The superiority of yeast-bread is apparent, and the method of making it very simple. A few years since, not more than two or three loaves of yeast-bread were found on the society table. It was difficult for some persons to believe that good bread could be made without butter, lard or soda. There is a decided improvement at the present, nice light loaves of delicious bread are now exhibited, showing that we are not slow in improvements, if we have the opportunity to learn.

RECIPE OF PREMIUM LOAF.

Three quarts flour, two-thirds cup potato-yeast, water sufficient to make stiff, set over night. In the morning add flour enough to knead and put in pans. Bake quickly in hot oven.

Mrs. John Pierce, *Chairman Com. on Bread.*

MASSACHUSETTS.

THE ONION-SMUT.*

By W. G. Farlow,
Assistant Professor of Botany in Harvard University.

Not quite two years ago, our attention was called by Professor W. H. Brewer of New Haven, to a disease of onions, popularly known as the smut, which was causing great injury in some parts of Connecticut, particularly near Wethersfield, where, as is well known, the onion forms the most important crop. We were not successful in obtaining any specimens of the disease until the spring of 1876, when we received some young onions affected with the smut, from Mr. S. B. Sherwood of Green's Farms, Conn., and Mr. S. M. Wells of Wethersfield. From the letters of Professor Brewer, and the statements of Mr. Sherwood and Mr. Wells, it seems that the smut makes its appearance in May, sometimes when the plants are only an inch high, but often not until they have reached a larger size. In some cases the bulbs do not grow at all, in others they grow to be as large as one's fist, but are "diseased between the layers." The injury to the onion crop is estimated by the gentlemen just mentioned at several thousand dollars a year in the region of Southport and Wethersfield, Conn., and they agree in stating that no application of sulphate of copper or similar substance to the seed has proved of any use where the disease has once got into the soil.

More recently, we have had some conversation with Mr. Benjamin P. Ware of Marblehead, Mass., who is an extensive cultivator of onions, and has suffered at times severe pecuniary loss in consequence of the injury to the crop caused by the smut. Mr. Ware makes the statement that his onions are attacked by two distinct diseases, one of which is found on the plants which are going to seed, the other on the young seedlings. The former appears like a white flocculent mould, which afterwards becomes blackish, and which is found principally on the seed-stalks. Of this disease we have seen no specimens, and cannot, of course, tell whether it is caused by a fungus or not. As it is said to occur in midsummer, and at rather dry seasons, we might suppose that, if caused by any fungus, it would probably be some species of *Erysiphe*. Mr. Ware is certain that the disease is more likely to occur in plants which have been bruised or handled so that the powdery coat, the glaucous covering of the leaves, has been removed. It is not impossible, judging from Mr. Ware's description, that it may be the same disease which is known in Europe to be caused by *Peronospora Schleideniana;* at any rate, it needs farther investigation.

---

* See Plate, frontispiece.

The second of the diseases described by Mr. Ware is the smut, as it is called in Massachusetts and Connecticut. It occurs at Marblehead and at several localities in Essex County, Mass., and, according to Mr. Ware, it has been known for a number of years at Danvers, where onions have been largely cultivated. Mr. Ware agrees with the statements of Messrs. Wells and Sherwood as to the early period at which the smut attacks the onion-plants, and says that, in some cases, the seedling continues to grow until the bulb has reached a diameter of about two inches, when the bulb as well as the leaves are affected by the smut; usually, however, if the bulb attains any size, it is not smutty throughout, but only in portions. The disease is first recognized by the appearance of a black substance in the central part of the leaves, the epidermis of which is soon ruptured, showing the centre of the leaf to consist of a black powder, traversed by a few stringy fibres.

If we consider the question, How long has the disease called the onion-smut been known in New England? we must come to the conclusion, if we can trust the different agricultural journals, that it is of recent origin. We limit the consideration of the question to New England, because, with the exception of certain parts of New York,* we cannot learn that the disease prevails in other parts of our country; at least an examination of the different state agricultural reports has failed to show any reference to it. As, however, some of the reports are not fully indexed, it may be that some such references have escaped our notice. Looking at New England alone, we find the references very scanty, and confined to the last ten years. It is rumored that the disease has been known for a good many years in some localities, as Danvers, but of the truth of these reports we have no assurance, inasmuch as all notices of the onion crop in the agricultural journals, until within the last few years, have not only been silent with regard to any disease, if we except the onion maggot, but have uniformly represented the crop as large and healthy. In fact, of the numerous references to the onion crop, contained in the "New England Farmer," from 1830 to 1845, one is astonished to find nothing but repeated assurances of enormous crops, with statements of the excellent results of sowing onions on the same spot year after year, and rare allusions to the trouble caused by the maggot. There is not a hint of trouble from the smut, and in only one instance is there any reference whatever to any disease caused by a fungus. In the "New England Farmer" * is the following paragraph:—

---

* We learn, however, from Mr. C. H. Peck, State Botanist of New York, that he is not aware that the disease occurs in that State.

> "This (onion) crop, which is very extensively cultivated in Danvers, has, during the rains and fogs of the month, been struck with a mildew which has entirely checked the growth. We noticed last week that a large part of the crop was already pulled. The size of the onions is apparently from half to two-thirds what they would have attained without this check."

This paragraph points with considerable probability to an attack of *Peronospora Schleideniana*, or some allied fungus, but certainly could not have been anything like the onion-smut. More recently, we find a writer in the "American Agriculturist" of March, 1861, asserting that the onion crop of that year at Danvers was large, and that good crops had been raised on the same spot for twenty consecutive years.

Within the last ten or a dozen years, however, the onion crop has not been as large as formerly, and within this period we have definite accounts of injury done by the smut. Exactly when and how the smut made its appearance, is difficult to decide. In the Report of the Massachusetts State Board of Agriculture for 1869–70, Appendix, p. 10, is a report of an address delivered by Mr. Benjamin P. Ware, at Newburyport, in which he speaks distinctly of the smut as doing great injury. The same gentleman, however, in a discussion in 1866,* makes no mention of the disease, which he would probably have done had it prevailed extensively at that time. In the Report of the Agricultural Department, Washington, 1869, p. 224, it is stated that "the onion is subject to few diseases, the fungus or smut being the only one which has caused any serious difficulty in its cultivation in this country." In the Report for 1872, p. 193, the smut is again referred to, and the experience of Mr. Ware is quoted. An examination of the Reports of the Connecticut State Board of Agriculture fails to show any reference to the smut, and as late as 1871, Mr. T. B. Wakeman,† writing from Westport, Conn., states that "onions are the most profitable crop a farmer can raise." Yet, in spite of this statement, in June, 1876, Mr. S. B. Sherwood writes from Green's Farms, in the immediate vicinity of Westport, that "the smut causes an injury of several thousand dollars annually to this town," and he implies that it has been known for several years. From such conflicting statements we can hardly do anything more than infer that, in spite of its virulence, the smut is limited in its range, and that, although it may have existed for some time, it certainly has not, until within the last ten years, been so serious as to attract marked attention.

---

* August 31, 1842, Vol. XXI., No. 9, p. 70.

As we have already said, in the spring of 1876 specimens of smutty onions were received from Green's Farms and Wethersfield, Conn., and, with this material, we have examined the fungus producing the smut. The fungus, which is peculiar to America, has, as far as we know, never been described. In June, 1876, we received some specimens from Mr. C. C. Frost of Brattleborough, Vt., bearing the manuscript name of *Urocystis Cepulæ*, which name we will adopt in speaking of the fungus. The specimens first received were three or four inches long, and some were examined at once, whilst others were placed in alcohol for future study. The specimens, although but little distorted in shape, were seen to be diseased, by the black color of the interior, which could readily be seen through the nearly transparent outer portion of the leaf. When split in two, it was plain that the outer and larger leaves were more diseased than the inner ones, some of which, as far as the naked eye could detect, seemed sound. The specimens which were received early in June had attained a height of from six to eight inches, but the bulb was not more than half or three-quarters of an inch in diameter. The outer part of the leaves had broken open, and the inside was seen to be composed of a stringy mass, covered with black powder. In some places almost all traces of the leaves had disappeared, nothing remaining but a shapeless mass of black dust, held together by a few threads. Where the leaves were comparatively sound, the epidermis was ruptured in streaks, which ran parallel with the length of the leaf. The young bulbs were marked on the outside with black streaks, which were smaller than those on the leaves, and some of the inner coatings were streaked, while others were comparatively sound. Fig. 4, frontispiece, represents a young plant where the disease is not very far advanced, and the epidermis is ruptured, showing the black smut inside.

---

* *Vide* Report of Massachusetts State Board of Agriculture, 1866–67, p. 176.

† *Vide* Report of Connecticut State Board of Agriculture, 1871, p. 275.

A microscopic examination of the black dust shows it to consist of spores, characteristic of the genus *Urocystis.* Three such spores are seen in fig. 5. Each spore consists of a single dark round central cell, the spore proper—rather rarely of two cells—surrounded by a number of small cells of a lighter color and thinner substance, each one being flattened on the side where it is in contact with the spore proper. The term applied to the smaller bodies is accessory spores, the *neben sporen* of German writers. A microscopic examination of the threads show a mixture of the tissue of the onion with the mycelium and spores of the *Urocystis.*

Returning to the leaves, which appear nearly sound, we find, at the distance of one or two inches from the black spots, that the tissue of the leaf is invaded by the mycelium of the *Urocystis.* It is most abundant near the vessels of the leaf, extending in tangled masses upwards and downwards, and giving off branches which run outwards, parallel to one another. Until the disease is far advanced, the outer portion of the leaves is nearly free from mycelium; but as the disease advances, the mycelium is found in the leaves, bulbs, and roots,—everywhere but in the epidermis. The threads of which the mycelium is composed are transparent, divided by frequent cross-partitions, branch in all directions, and unite with, and are twisted about, one another, so as to form a most intricate network. The mycelial threads are always between the cells of the onion-plant, and never penetrate into them. We have never been able to discover any suckers (*haustoria*). Of the mode of production of the spores from the mycelium, we shall say a few words later.

Some of the spores were sown on moist glass slides to ascertain the mode of germination. Those sown in June were kept about three weeks, when they became so mouldy that there was no possibility of being able to observe the germination, and they were consequently thrown away. No change had taken place, except that some of the accessory spores had dropped off from the spore proper. Later in the summer some of the spores were placed on moistened slides and in watch-glasses, where they were allowed to remain for six weeks, when the observations were necessarily interrupted. At the end of that time they had not germinated, although a large share of the accessory spores had dropped away from the spores. It would seem, from these unsuccessful attempts, that germination only takes place after a certain interval of rest of the spores.

From the brief description just given, it appears that the onion-fungus belongs to the order *Ustilagineæ*, as usually understood, to which also belong the smut of Indian corn, rye, etc. Botanically considered, very little is known about the development of the plants of this order; but it is not supposed that they pass through different stages, found upon different plants, as is believed to be the case with the rust in grain. By smut is generally meant, in this country, *Ustilago Mayidis*, which causes the smutty ears in Indian corn. The spores of that species, represented in fig. 6, are destitute of the accessory spores found in the onion-smut; they are much smaller, and are covered with fine points. The onion-smut resembles more closely the smut of rye, *Urocystis occulta*, which is common near Boston in the month of June. Fig. 3

represents the spores of the rye-smut, which are somewhat larger than those of the onion-smut; and instead of there being, as is most frequently the case with the last-named fungus, one central spore, there are usually two or three clustered together. Figs. 1 and 2 represent the rye as it appears when attacked by *Urocystis occulta.* The fungus generally affects the stalk of the ear so that, as the disease advances, the ears fall over by their own weight, the stalk, which has been burst open by the disease, not being strong enough to support them. This drooping of the ears is very characteristic, and by it the presence of the disease in a field of rye can be recognized even at some little distance.

The genus *Urocystis*, as generally defined, differs from *Ustilago*, to which the corn-smut belongs, by the presence of accessory spores, as we have described. *Thecaphora*, a rather rare genus, of which the only American representative, growing on a grass-like plant, is *Thecaphora aterrima* Tul, found by Professor C. E. Bessey on a species of *Carex* at Ames, Iowa, has spores united in clusters like the central spores of *Urocystis occulta*, fig. 3, but destitute of accessory spores. Of the species of *Urocystis*, besides *U. Cepulæ*, found on onions, and *U. occulta*, already described on rye, there is a third species common in New England, *U. pompholigodes*, found on the wood anemone, in the stalks and leaves of which it produces blackish purple swellings. The two last-named species are also found in Europe, but *U. Cepulæ* is found only in America. The question arises, Where can *U. Cepulæ*, the onion-smut, originally have come from? Certainly not from Europe, for it is unknown there. Then how does it happen that, on a cultivated plant introduced from Europe, there is found a new and peculiar fungus which, as far as we know, has never been found on any plant native to America? Spontaneous generation is, of course, in the present state of science, quite insupposable, nor can we say that the *Urocystis* on onions is only a variety of that found on rye or the wood anemone, for apart from what seem to us specific anatomical differences, it is true that the species of *Urocystis* on rye and the wood anemone are as common, or more common, in Europe than in America, and yet no smut is found on the onion in Europe which comes from the same stock as our own.

The most probable supposition is that the onion-smut came originally from some of our wild species of onion; for although it has never yet been found on any wild species, it must be borne in mind that the fungi of this country have as yet been but very imperfectly explored. The species of *Urocystis* most nearly related to *U. Cepulæ* is, perhaps, *U. Colchici* of Europe. We cannot find any record of the *Colchicum* having been introduced into this country, and it is, therefore, futile to discuss the question of the connection between *U. Cepulæ* and *U. Colchici*. Recently,* Mr. Worthington G. Smith has described a new species of *Urocystis*, which produces a disease of gladiolus bulbs. Judging from his figure, however, it would seem to differ essentially from *U. Cepulæ* in having a number of spores packed together in one mass, whereas the onion-smut has generally only one, or, at the most, two spores united together.

Having thus passed in review the history of the disease, and examined the fungus which causes it, let us consider the application of the facts already enumerated to the method of checking the disease. We have seen from the character of the fungus, that we are not to expect to find any secondary, or hibernating, stage of the fungus in any plant growing with or near the onion crop. On the contrary, the complete growth and development of the fungus is in the onion-plant itself, or possibly also in some of the wild species of onion, although the last has not been proved. It is evidently a wise precaution to destroy wild onions when growing near cultivated fields. As a matter of fact, the wild onions of New England are not sufficiently abundant to be much feared; but farther South, in Southern Pennsylvania and Virginia, they prove very common and troublesome weeds. It seems to have been considered a fact by the farmers of the Southern Middle States, that onions cannot be as easily cultivated with them as farther East. It would be interesting to know whether there is any connection between the greater difficulty experienced in raising onions in the South, and the greater abundance of wild onions. If the smut came originally from the wild onion, we should expect such to be the case.

---

* *Vide* Gardener's Chronicle, 1876, p. 420–22, and Monthly Microscopic Journal, December, 1876, p. 304.

In speaking of the means of checking the disease, we must necessarily consider two questions: first, is the smut propagated by the onion-seed; and, secondly, is it brought on by the exhaustion of the soil by continued crops. With regard to the first question, we can state that there is very little chance of the smut being propagated by seed. Very few of the plants affected by the disease ever ripen seed, and, of the seed-plants, the fruit does not ripen until the smut has mostly disappeared from neighboring plants, so that there is little chance of the ripe seeds having the spores of the smut blown upon them. It would be well to let the seed soak in water for some hours, that if by any accident any spores are adhering to them, they may be washed off. With regard to the second point, without losing sight of the fact that a feeble plant is more likely, in general, to contract any disease than a thrifty one, it is certain that no amount of exhaustion of the soil will bring on the smut unless the spores of the *Urocystis* are present, and, if the spores are present, the smut will follow, no matter how good the soil. So far, the object of the onion-raiser has been, by a change or increase of fertilizers, to try to get rid of the disease. This is a mistake. The thing is not to introduce any new substance into the soil, but to get rid of something which is already there; viz., the spores of *Urocystis Cepulæ*. Nothing which can be put into the soil in the way of manure is at all likely to kill the spores. A glance at fig. 5 will show that the spores of the onion-smut fungus are extraordinarily well protected; in fact, there are scarcely any spores of fungi so well protected as those of the species of *Urocystis*. A comparison of fig. 5, which represents the spores of the onion-smut, with fig. 6, which represents those of the corn-smut, will show why the former should be more difficult to destroy than the latter. Besides the tough nature of the spores proper, they are surrounded by a layer of tough cells already described as accessory spores.

The expression used by all persons with whom we have corresponded in relation to the smut, that the disease is in the ground, is well founded. The disease,—that is, the spores of the fungus,—is in the ground, and there it will stay unless removed mechanically, for no substances which can be used at all as manure can be expected to destroy it. Theoretically, it would seem to be well to pull up and destroy plants as soon as the smut makes its appearance. Practically, as Mr. Ware suggests, the disease first appears when the plants are so small that they cannot well be pulled. It is, however, very desirable to pull up and burn all plants which reach any size and are affected by the disease. The best plan is to burn over fields where the disease has appeared. This is best done in June, but it may also be done with advantage in autumn. In neither case should the soil be previously dug up, for, by so doing, the spores, most of which are on or near the surface, are only the more likely to be removed beyond reach of the fire. To prevent the spread of the disease, all agricultural implements which have been used in soil where the smut exists should be thoroughly cleansed before using again elsewhere.

After all, the means of checking the disease which we have just mentioned, are only partial. Some of the spores will have remained behind in spite of all care; enough, perhaps, to cause the next onion crop, if planted on the same spot, to be diseased. The great question is, What becomes of the spores which remain behind? If an onion crop is started on the same spot the next year, the spores may germinate and reproduce the disease. If other crops are planted, of course no harm is done. Then comes the all-important question, For how many years do the spores of the smut fungus retain their germinative power, and how many years after one onion crop, which was affected by the smut, must one wait before again planting onions on the same spot? On this point, testimony is conflicting; but about four or five years is apparently the limit, for although some gentlemen, who have been so kind as to communicate their views on this question, believe that the smut has reappeared in fields after twenty years' freedom from onion crops, yet we must believe that, unconsciously, these statements are much exaggerated.

Mr. B. P. Ware assures us that the farmers of Essex County, Mass., have found by experience that four years is the limit within which it is unsafe to repeat the crop, and, by a coincidence which would seem to warrant the accuracy of the statement of Mr. Ware, Wolff states that the spores of *Urocystis occulta*, the rye-smut (which, in their germinating power, very much resemble those of the onion-smut), retain their germinating power for only four years. We must confess that we are skeptical as to the accuracy of statements made about the smut twenty years ago, because, as we remarked in the beginning, we have not been able to find in the journals any record even of the existence of the disease at that date, and it is hardly to be supposed that, if the disease was not prevalent and general enough to cause some passing notice in the journals, that any systematic observations about its effects on the soil would have been made at that remote period. In short, we may say that the smut will cause comparatively little harm if onions be not replanted on any spot until after an interval of four years, and if the precautions which we have advised, against the spread of the disease, be adopted. It is fortunate that the diseased plants are generally so small that the greater part of the spores fall upon the ground, and are not carried any distance by the wind, it being probable that the disease is carried from one field to another by means of passing animals and farming implements, quite as frequently as by the wind. In fact, it does not spread with great rapidity, and, although we may expect that eventually it will be found all over the country, yet by proper care such need not be the case.

The disease is at present limited to Massachusetts and Connecticut,* but no very serious trouble is experienced except in towns like Wethersfield and Westport, where the onion is almost the exclusive crop. In such towns, it is almost hopeless to expect much relief, because the farmers over any extensive tract of land are unwilling to give up their favorite crop for so long a time as four years. Some good, however, may arise from the precautions we have enumerated. In places where the disease has just appeared, it is as much the duty of the town officers to compel persons, on whose farms the smut has appeared, to burn the land and afterwards avoid planting onions for at least four years, as it is to remove patients with the small-pox, or to compel children, in families where there is scarlet fever or diphtheria, to keep away from school.

---

* We are not sure whether the specimens sent by Mr. C. C. Frost of Brattleborough were collected in Vermont.

NOTE.

Inasmuch as the fungus causing the smut has not,* as far as we know, been as yet scientifically described, a word or two on its botanical relations will not be out of place. The species of *Urocystis* are distinguished principally by the characters of the spores, which consist of spores proper and accessory spores. The onion-smut may be described as follows:—

UROCYSTIS CEPULÆ.—*Frost, mscr. Spores globular, from .0012 m.m. to .00155 m.m. in diameter, composed of, generally, one, occasionally of two, dark brown spores proper, surrounded by numerous, twelve to twenty, accessory spores. Germination unknown. Mycelium, about .00018 m.m. in diameter. In leaves and bulbs of cultivated onions. Spring and early summer.*

This species differs from *Urocystis occulta* and *U pompholigodes* in the smaller size of the spore masses, the spores proper being generally single instead of united by twos and threes, and in the smaller size and usually greater number of the accessory spores.

In recent times a discussion seems to have arisen as to whether the species of *Uroeystis* should be considered as related to the *Ustilagineæ*, or rather as mere *sclerotioid* forms of unknown species. The present state of mycological science would hardly seem to justify any pronounced expression of opinion. Accepting, however, the excellent observations of Wolff on the germination of the spores of *Urocystis occulta*, we must confess that the formation of the spores in *Urocystis* hardly seems to justify referring the genus to the *Ustilagineæ*, even if the germination points in that direction. On the other hand, if we may judge by *Urocystis Cepulæ*, to consider the genus a form of sclerotium hardly seems allowable.

An examination of the mycelium of the onion-smut shows the following manner of formation of the spores: There first appears a small lateral swelling of the hypha, which divides by a partition at right angles to the length of the hypha into two cells, or else, as is not unfrequently the case, the two cells arise from the hypha simultaneously and close to one another. Figs. 1 and 2. Of the two cells which thus arise, one enlarges so as to become nearly spherical, whilst the other elongates into a worm-like body which bends over the surface of the other cell. In a short time the worm-like thread is divided into a number of cells by partitions at right angles to its length. Fig. 3. The cells into which the worm-like body is thus divided then bud out at the sides and grow down in a winding manner so as to cover the original globular cell. By subsequent division of these winding cells the accessory spores are formed. This process, in its initial stage, reminds one of what takes place in *Podosphæra*. There is here, however, nothing like a conjugation, and the worm-like body can in no sense be considered a pollinodium. In *Urocystis Cepulæ*, at any rate, the theory that the accessory spores are formed by the indefinite interlacing of the hyphæ around the globular cell, is not true. They arise from a single definite, worm-like thread.

---

* In the Report of the Agricultural Department, Washington, 1872, p. 133, is a short notice of the onion-smut, accompanied by a figure in which, amongst other objects, some spores of *Urocystis Cepulæ* are represented. The accompanying description is, where not hopelessly confused, entirely incorrect. The fungus is called a *Peronospora;* to which genus, however, the figures do not bear the least resemblance. It would be quite impossible to recognize the fungus from the description given.

In this connection may be allowed a few words about a fungus which we have twice found on mouldy bread in connection with *Mucor stolonifer.* The mucor seemed to be destroyed by a brownish purple mould, which, at first sight, was mistaken for the chlamydospores of the mucor. Microscopic examination showed a fungus bearing a strong resemblance to Corda's figure of *Papulaspora sepedonioides.* In the present case we wish merely to refer briefly to the formation of the fruit, which is evidently sclerotioid in nature. When ripe, it bears a very close resemblance to the spores of a *Urocystis.* The spore proper, although usually single, as in fig. 5, is sometimes double. The hyphæ, fig. 4, coil spirally, not crozier fashion, as might be supposed from the figure; they are then divided by cross-partitions into cells, from which bud-like projections, *a*, *b*, *c*, fig. 4, are given off. One of the lower of these, as *a*, pushes up into the interior of the spiral, grows into an oval form, and becomes the spore proper; and the others, *b*, *c*, etc., wind round it, forming ultimately the accessory spores. The resemblance, both in the mode of formation and the conformation of the ripe spores, between the present fungus and a species of *Urocystis*, is certainly not very remote, but this is not the place to discuss the subject in detail.

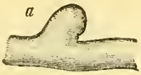


Fig. 1

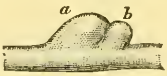


Fig. 2.

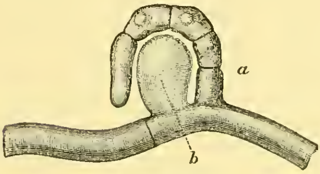


Fig. 3.

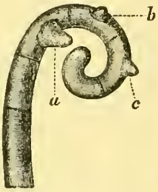


Fig. 4.

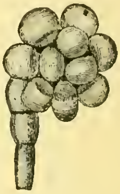


Fig. 5.

In conclusion, allow me to return my sincere thanks to Professor Brewer and Messrs. Sherwood, Ware, and Welles for the materials and information which they have kindly furnished me.

APPENDIX.

LAWS RELATING TO THE BOARD OF AGRICULTURE.

[General Statutes, Chapter 16.]

Section 1. The governor, lieutenant-governor, and secretary of the Commonwealth, one person appointed from and by each agricultural society which receives an annual bounty from the state, and three other persons appointed by the governor with the advice and consent of the council, shall constitute the State Board of Agriculture.

Sect. 2. One-third of the appointed members of the board shall retire from office on the first Wednesday in February in each year, according to their appointments. The vacancies thus occurring shall be filled by the governor and council or the agricultural societies as the offices were before filled, and the persons thus appointed shall hold their offices for three years from the expiration of the former terms. Other vacancies may be filled in the same manner for the remainder of the vacant terms. The present members of the board shall continue to hold their offices during the terms for which they were appointed.

Sect. 3. The board shall meet at the state house at least once in each year, and as much oftener as may be deemed expedient. No member thereof shall receive compensation from the state, except for personal expenses when engaged in the duties of the board.

Sect. 4. They may appoint and prescribe the duties of a secretary of the board, who shall receive a salary of two thousand dollars a year; and who at such times as the board approve may employ a clerk at a salary not exceeding six hundred dollars a year.

Sect. 5. They shall investigate such subjects relating to improvements in agriculture in this state as they think proper, and may take, hold in trust and exercise control over donations or bequests made to them for promoting agricultural education or the general interests of husbandry.

SECT. 6. They may prescribe forms for and regulate the returns required of the different agricultural societies, and furnish to the secretary of each such blanks as they deem necessary to secure uniform and reliable statistics.

SECT. 7. They shall annually, on or before the fourth Wednesday of January, by their chairman or secretary, submit to the legislature a detailed report of their doings, with such recommendations and suggestions as the interests of agriculture may require.

SECT. 8. The secretary of the board shall in each year cause to be made and published for distribution as full an abstract of the returns of the agricultural societies as he deems useful.

SECT. 9. He may appoint one or more suitable agents to visit the towns in this state, under the direction of the board, for the purpose of inquiring into the methods and wants of practical husbandry, ascertaining the adaptation of agricultural products to soil, climate and markets, encouraging the establishment of farmers' clubs, agricultural libraries and reading-rooms, and of disseminating useful information in agriculture by means of lectures and otherwise. Such agents shall annually, in October, make detailed reports to the secretary of the board.

[Acts of 1866, Chapter 263.]

SECTION 1. The board of agriculture shall constitute a board of overseers of the Massachusetts Agricultural College, with powers and duties to be defined and fixed by the governor and council. But said board of overseers shall have no powers granted to control the action of the trustees of said college, or to negative their powers and duties, as defined by chapter two hundred and twenty of the acts of the year eighteen hundred and sixty-three.

SECT. 2. The board of agriculture is hereby authorized to locate the state agricultural cabinet and library and to hold its meetings in said college.

SECT. 3. The president of the Agricultural College is hereby constituted a member *ex officio* of the board of agriculture.

[Acts of 1874, Chapter 206.]

SECT. 4. The chemist of the state board of agriculture shall be *ex officio* a member of said board and state inspector of fertilizers. It shall be the duty of said inspector to analyze one or more specimens of every kind of commercial fertilizer coming within the provisions of this act, which may be offered for sale within this Commonwealth, and of which he shall be informed by the secretary of the state board of agriculture; and for this purpose he is authorized to take from any package or packages of said fertilizers which may be in possession of any dealer a sample not exceeding one pound in weight. He shall report annually to the state board of agriculture the results of his inspection and the analysis made by him, and furnish to the secretary of said board such important information in regard to commercial fertilizers as he may from time to time obtain.

. . . . .

SECT. 6. It shall be the duty of said inspector upon ascertaining any violation of this act to forthwith inform the manufacturer and the secretary of the state board of agriculture in writing thereof. And it shall be the duty of said secretary to immediately institute proceedings against all parties violating this act.

LAWS RELATING TO AGRICULTURAL SOCIETIES.

[General Statutes, Chapter 66.]

SECTION 1. Every incorporated agricultural society which has raised by contribution of individuals and put out at interest on public or private security, or invested in real estate, buildings and appurtenances for its use and accommodation, the sum of one thousand dollars, as a capital appropriated for the uses of the society, shall be entitled to receive, in the month of October annually, out of the treasury of the Commonwealth, the sum of two hundred dollars, and in that proportion annually for any greater sum so contributed and put at interest or invested; but no society shall receive from the treasury more than six hundred dollars in one year.

SECT. 2. Every society which claims said bounty shall annually, on or before the tenth day of December,* file in the office of the secretary of the board of agriculture a certificate signed by its president and treasurer, specifying under oath the sum so actually contributed and put at interest or invested in real estate, buildings or appurtenances for its use and accommodation, and then held so invested or well secured as a capital stock.

SECT. 3. The amount of bounty to which a society is entitled for any year shall be ascertained by the certificate last filed by it under the preceding section.

SECT. 4.† No society receiving the bounty shall distribute any part thereof for an animal or article for which a premium is awarded, unless it was produced within the limits of the society, or the animal has been owned and kept within its limits, by the person to whom the premium is awarded, for three months next preceding the award. And no animal or article for which a premium has been awarded to the owners by any such society shall be considered a subject for any further premium of the society, except for qualities different from those for which the former premium was awarded, or for a higher premium, and no animal or article shall be offered for a premium at more than one such society in the same year; but nothing in this chapter shall affect, restrain or limit a competitor for premiums offered by the state board of agriculture or the Massachusetts society for the promotion of agriculture to be awarded within the incorporated county agricultural societies, but such premiums shall be subject to the rules and regulations prescribed by said board or the trustees of said Massachusetts society.

---

* Changed in 1874 to January 10.

† This section was repealed in 1865. See Laws and Resolves, 1865, chapter 90.

SECT. 5. Every such society shall annually, on or before the tenth day of December,* make a full return of its doings, signed by its president and secretary, to the secretary of the board of agriculture, embracing a statement of the expenditure of all money, specifying the nature of the encouragement proposed by the society, the objects for which its premiums have been offered, and the persons to whom they have been awarded, and including all reports of committees and all statements of experiments and cultivation regarded by the president and secretary as worthy of publication; and shall accompany the same with such general observations concerning the state of agriculture and manufactures in the state as it may deem important or useful. The returns, whether in printed or manuscript form, shall be marked in such manner that those passages in the several reports and statements deemed by such officers most worthy of public notice, study and application may be easily distinguished.

SECT. 6. A society which neglects in any year to comply with the laws relating thereto, or with the regulations of the board of agriculture, shall not be entitled to the bounty of the state the year next succeeding.

SECT. 7. Every society which receives said bounty shall offer annually, by way of premiums, or shall otherwise apply for the encouragement or improvement of agriculture or manufactures, a sum not less than the amount so annually received, and shall offer such premiums for agricultural experiments and in such manner as the state board of agriculture requires.

SECT. 8. Every such society shall annually offer such premiums and encouragement for the raising and preserving of oaks and other forest-trees, as to it seems proper and best adapted to perpetuate within the state an adequate supply of ship-timber.

SECT. 9. All money offered for premiums which is not awarded or paid shall be put out at interest and added to the capital stock of the society.

SECT. 10. The foregoing provisions shall not extend to an agricultural society incorporated for any territory less than a county, except by special enactment for that purpose.

SECT. 11. Incorporated agricultural societies may by their officers define and fix bounds of sufficient extent for the erection of their cattle-pens and yards, and for convenient passageways to and about the same, on the days of their cattle shows and exhibitions, and also for their ploughing matches and trials of working oxen; within which bounds no person shall be permitted to enter or pass unless in conformity with the regulations of the officers of such societies.

---

* Tenth day of January now; changed in 1874 by Act of Legislature.

Sect. 12. Whoever, contrary to the regulations, and after notice thereof, enters or passes within the bounds so fixed, shall forfeit a sum not exceeding five dollars.

Sect. 13. The foregoing provisions shall not authorize a society to occupy or include within such bounds the land of any person without his consent, nor to obstruct the public travel on any turnpike or public highway.

Sect. 14. The officers of each society may appoint a sufficient number of suitable persons, inhabitants of the county, to act as marshals at cattle shows and exhibitions, who shall have and exercise all the powers of constables in relation to the preservation of the public peace, and the service and execution of criminal process within the respective towns where such shows and exhibitions are held, and which process may be directed to them accordingly; and they shall exercise their office from twelve o'clock at noon of the day preceding the commencement of such shows and exhibitions, until twelve o'clock at noon succeeding the termination thereof, and no longer.

Sect. 15. No incorporated agricultural society shall award a premium for a field crop, without satisfactory evidence under oath presented to its committee or other officers, that the whole merchantable crop entered for premium was weighed when harvested, if a grass or root crop, and when threshed or husked if a grain or corn crop; but such society may require further modes of ascertaining the merchantable amount of product, either at the time of harvesting or at other times.

Acts and Resolves, 1861.

[Chapter 127.]

Sect. 1. Any agricultural society or farmers' club shall have power and authority to establish such regulations as it may deem necessary and expedient for the preservation of peace and good order of said society at its regular or annual meetings, shows, fairs or exhibitions, or for the protection of the interests of the same during such shows, fairs or exhibitions: *provided*, that such regulations shall not be repugnant to the laws of the Commonwealth; and *provided, also*, that said society shall cause at least five copies of its regulations to be posted in as many public places on the grounds of said society, not less than forty-eight hours before the time of holding its meetings.

SECT. 2. No person shall, during the time of holding any cattle show, fair or exhibition, or meeting of any farmers' club, establish any tent, booth or vehicle of any kind, within one-half mile of the place of holding said shows or meetings, for the purpose of vending any goods, wares, merchandise, provisions or refreshments, without the consent of the proper authorities having charge of the same; nor shall any person be allowed to engage in any gaming, or horse racing, or to exhibit any show or play during the time of holding any cattle show, agricultural fair, or meeting of any farmers' club at any regular or stated time: *provided*, that any person having his regular place of business within such limits is not hereby required to suspend his business.

SECT. 3. If any person shall violate any of the provisions of this act, he shall forfeit for each offence a sum not exceeding twenty dollars.

[Chapter 180.]

SECT. 1. The premiums offered by any agricultural society receiving bounty from the treasury of the Commonwealth under the provisions of the sixty-sixth chapter of the General Statutes, shall be subject to the competition of every citizen of the county in which such society is established. And every such society shall admit as members, upon equal terms, citizens of every town in the county in which the same is located.

LAWS AND RESOLVES, 1865.

[Chapter 67.]

The ninth section of chapter one hundred and sixty-seven of the General Statutes shall not be so construed as to make unlawful, trials of the speed of horses for premiums offered by legally constituted agricultural societies.

[Chapter 90.]

SECT. 1. Agricultural societies receiving bounty from the Commonwealth shall make such rules and regulations in the distribution thereof, as shall in their opinion best promote the improvement of agriculture; subject, however, to the restrictions of sections six, seven, eight and nine of chapter sixty-six of the General Statutes.

Laws and Resolves, 1866.

[Chapter 189.]

Sect. 1. No agricultural society, not drawing bounty from the state, shall hereafter be entitled to such bounty as allowed in chapter sixty-six, section first, of the General Statutes, in case the grounds and buildings for holding exhibitions of said society are within twelve miles of the grounds and buildings of any other society now by law entitled to such bounty.

Sect. 2.* Any agricultural society publishing its transactions and making its returns to the secretary of the board of agriculture, as provided in chapter sixty-six, section fifth of the General Statutes, shall be entitled to a delegate to said board, under the provisions of chapter sixteen of the General Statutes; and it shall be the duty of the secretary of said board to notify any society which has complied with the above requirements, that it is empowered to choose the delegate aforesaid.

Sect. 3. The state board of agriculture shall have power to fix the days on which the agricultural societies shall commence their annual exhibitions.

Laws and Resolves, 1870.

[Chapter 258.]

Chapter sixty-six of the General Statutes is hereby so altered and amended that no agricultural society shall be entitled to receive a larger amount from the treasury of the Commonwealth, in any one year, than it shall have awarded and actually paid in premiums during the year last preceding.

Laws and Resolves, 1874.

[Chapter 182.]

Section five of chapter sixty-six of the General Statutes is hereby amended by striking out the word "December" in the second line of said section, and inserting in place thereof the word "January."

---

* Repealed 1869, chap. 128. Laws and Resolves.

REQUIREMENTS OF THE BOARD OF AGRICULTURE.

In the Report of the Secretary of the Board for 1866, page 307, is the following preamble and vote:—

"*Whereas*, The State Board of Agriculture is of the opinion that the Legislature intended, in return for the bounty granted to the agricultural societies by the State, that the societies should, by their printed reports, as well as by other means, furnish to the people valuable information concerning the subject for which premiums are offered by them; and,

"*Whereas*, Their reports are generally deficient in this respect, owing principally to the neglect of committees in elaborating their reports to the societies by describing more fully the objects in competition, the reasons of success or failure;

"*Voted*, That the several agricultural societies receiving the bounty of the State be required hereafter to offer, annually, *three premiums* of not less than eight, six, and four dollars, respectively, for the best reports of committees who recommend the awards of premiums.

In 1870, the Board—

"*Voted*, That no society receiving the bounty of the State shall, after the present year, bestow any premiums or gratituties on grade or native bulls.

"*Voted*, That the various agricultural societies of the Commonwealth be requested to organize an annual meeting for lectures and discussions at such time and place as may be convenient to each society; these meetings to be denominated The Farmers' Institutes of Massachusetts.

In 1872, the Board—

"*Voted*, That in the opinion of this Board it is very desirable that the various agricultural societies in this Commonwealth maintain scholarships at the Agricultural College, and select the young men who are to receive the benefit of the same by competitive examination, and so far as practicable, from those who intend to become farmers or gardeners.

In 1873, the Board—

"*Voted*, That, hereafter, the Secretary be instructed to withhold his approval of the payment of any state bounty to any society which shall bestow any premiums or gratuities on grade or native bulls.

STATISTICS OF MASSACHUSETTS AGRICULTURE.

Allusion is made elsewhere in this Report to the very carefully prepared Census of Massachusetts for 1875, prepared under the direction of Col. Carroll D. Wright. The immense mass of material it contains, and the admirable system under which it is arranged, gives us at a glance the actual condition of Massachusetts agriculture of to-day. Col. Wright, in the introduction to the volume on agricultural products and property, says :—

> "Great care has been taken in the presentation of the purely agricultural products to correct all inherent errors, especially in the relation of values to quantity, and to this end much research and investigation have been undertaken, and with the best of results. Occasionally it may be found that the quantity of grain, potatoes, or other product is out of proportion to the value; but this, if it occurs at all, is either explainable by peculiar local influences, or by some extra quality, or else it is error. For instance, the value of apples in some towns in the State, as given, bears no relation to the values given in other towns; but the value given by the producer was that realized, and that depends not only upon the time of year he disposed of his apples, but their kind and quality. Two dollars per bushel for some kinds of apples might seem high, and yet the report be true. A town may raise principally apples of some extra grade, while the apple crop of another town might be in cider apples of little value. Again, in the examination of the milk yield: in a few towns the price will be found to be as low as six or eight cents per gallon, a figure much too low, and which calls for special reasons, and they are found in the fact that the milk crop as reported includes skimmed milk sold by the producer at low rates for special purposes; this, of course, in a few instances operates to bring down the average for such localities, and affects, to a slight degree, the general average for the State. So in all other products, variations will be found in comparing one town with another."

The following table gives the agricultural products for 1845, 1855, 1865, and 1875. The returns in 1865 included "other esculent vegetables" with beets, and in 1845 and 1855 they included "poultry" with eggs and "eggs" with poultry; in 1865, also, "tomato plants" were included with tomatoes :—

AGRICULTURAL PRODUCTS.

PRODUCTS.	1845.	1855.	1865.	1875.
APPLES, bushels,	–	–	–	3,252,957
Total value,	–	$1,121,262	$1,244,420	$1,450,252
Value per bushel,	–	–	–	$0.45
BARLEY, bushels,	121,931	99,430	138,524	46,884
Total value,	$72,261	$110,158	$184,343	$47,655
Value per bushel,	$0.52	$1.11	$1.33	$1.02
Acreage,	–	4,971½	7,103¾	1,828⅜
Bushels per acre,	–	20	19½	25½
BEANS, bushels,	–	–	6,389½	41,879
Total value,	–	–	$22,468	$97,052
Value per bushel,	–	–	$3.52	$2.32
Acreage,	–	–	149½	1,354⅛
Bushels per acre,	–	–	42¾	31
BEEF, pounds,	–	–	70,825,396	12,258,542
Total value,	$225,918	–	$8,188,564	$1,068,154
Value per pound,	–	–	$0.12	$0.09
BEETS, bushels,	–	–	133,589	237,880
Total value,	–	–	$117,161	$116,091
Value per bushel,	–	–	$0.88	$0.49
Acreage,	–	–	690	974⅞
Bushels per acre,	–	–	193½	244⅝
BUCKWHEAT, bushels,	32,274	–	64,259	52,127
Total value,	$15,099	–	$64,621	$46,911
Value per bushel,	$0.47	–	$1.00	$0.90
Acreage,	–	–	4,606¾	3,609¼
Bushels per acre,	–	–	13⅞	13¾
BUTTER, pounds,	7,688,556	8,116,009	3,745,293	7,922,431
Total value,	$1,116,709	$1,678,558	$1,360,248	$2,747,878
Value per pound,	$0.15	$0.21	$0.36	$0.35
CABBAGE, heads,	–	–	–	7,660,722
Total value,	–	–	$184,869	$440,691
Value per head,	–	–	–	$0.06
CARROTS, bushels,	–	632,117	225,015	191,646
Total value,	–	$148,041	$105,695	$86,503
Value per bushel,	–	$0.23	$0.47	$0.45
Acreage,	–	1,479⅞	623¾	439¼
Bushels per acre,	–	427⅛	360¾	436
CELERY, bunches,	–	–	–	627,329
Total value,	–	–	$2,750	$49,614
Value per bunch,	–	–	–	$0.08
CHARCOAL, bushels,	775,925	2,657,212	2,301,245	1,015,073
Total value,	$48,477	$237,469	$250,424	$120,556
Value per bushel,	$0.06	$0.09	$0.11	$0.12
CHEESE, pounds,	7,262,637	5,762,776	3,560,481	1,280,234
Total value,	$398,174	$464,251	$582,353	$162,826
Value per pound,	$0.05	$0.09	$0.16	$0.13
CIDER, gallons,	–	–	271,680	5,613,846
Total value,	–	–	$21,764	$668,809
Value per gallon,	–	–	$0.08	$0.12

Products.	1845.	1855.	1865.	1875.
Corn, Indian, . bushels,	1,985,215	2,595,096	2,015,771	1,040,290
Total value, . . .	$1,352,677	$2,820,109	$2,953,067	$1,006,384
Value per bushel, . .	$0.68	$1.09	$1.46	$0.97
Acreage, ...	–	91,056	70,141½	29,193¾
Bushels per acre, . .	–	28½	28¾	35¾
Corn, Green, . bushels,	–	–	–	199,496
Total value, . . .	–	–	–	$134,170
Value per bushel, . .	–	–	–	$0.67
Cranberries, . bushels,	–	–	34,621	110,184
Total value, . . .	–	$135,200	$101,538	$288,113
Value per bushel, . .	–	–	$2.93	$2.61
Cucumbers, . bushels,	–	–	1,000	38,236
Total value, . . .	–	–	–	$43,844
Value per bushel, . .	–	–	–	$1.15
Number, ...	–	–	2,365,000	37,414,726
Value of above, . .	–	–	–	$119,490
Value per hundred, .	–	–	–	$0.30
Total value, . . .	–	–	$35,627	$163,334
Eggs, . . . dozen,	–	–	–	3,446,530
Total value, . . .	$25,891	$52,688	$372,912	$903,357
Value per dozen, . .	–	–	–	$0.26
Grapes (ordinary), . . bushels,	–	–	877	19,836
Total value, . . .	–	–	–	$32,635
Value per bushel, . .	–	–	–	$1.65
Grapes (best, including hothouse), . . pounds,	–	–	24,415	267,617
Total value, . . .	–	–	–	$34,624
Value per pound, . .	–	–	–	$0.13
Total value, . . .	–	–	$40,100	$67,259
Hay, clover, . tons,	–	–	–	3,443
Total value, . . .	–	–	–	$51,903
Value per ton, . . .	–	–	–	$15.07
Acreage, ...	–	–	–	2,959
Tons per acre, . . .	–	–	–	1.13
Hay, English, . tons,	–	487,344½	479,837	526,490
Total value, . . .	–	$7,362,006	$10,537,789	$9,106,159
Value per ton, . . .	–	$15.11	$21.96	$17.30
Acreage, ...	–	498,480¼	507,163¼	509,294
Tons per acre, . . .	–	.98	.94	1
Hay, meadow, . tons,	–	129,151¼	115,447	116,211
Total value, . . .	–	$1,054,743	$1,274,956	$1,225,456
Value per ton, . . .	–	$8.17	$11.04	$10.55
Acreage, ...	–	–	142,193¼	130,792
Tons per acre, . . .	–	–	.80	.88
Hay, millet, . tons,	1,339	–	–	2,418
Total value, . . .	$8,476	$5,509	–	$41,918
Value per ton, . . .	$6.33	–	–	$17.33
Acreage, ...	–	303¼	–	1,619
Tons per acre, . . .	–	–	–	1.50
Hay, salt, . . tons,	–	32,115	29,147	22,568
Total value, . . .	–	$285,568	$339,659	$234,832
Value per ton, . . .	–	$8.89	$11.65	$10.46
Acreage, ...	–	–	31,477	23,519
Tons per acre, . . .	–	–	.92	.96

Products.	1845.	1855.	1865.	1875.
Hay, all kinds, tons,	604,821	648,610¾	624,431	671,130
Total value,	$5,222,833	$8,707,826	$12,152,404	$10,660,268
Value per ton,	$8.63	$13.42	$19.46	$15.88
Acreage,	–	–	680,833⅜	668,183
Tons per acre,	–	–	.92	1
Ice, tons,	–	387,100	650,359	395,184
Total value,	–	$639,100	$735,077	$500,666
Value per ton,	–	$1.65	$1.13	$1.27
Lettuce, heads,	–	–	–	2,683,211
Total value,	–	–	–	$96,410
Value per head,	–	–	–	$0.04
Manure, cords,	–	–	–	422,478
Total value,	–	–	–	$2,321,373
Value per cord,	–	–	–	$5.49
Milk, gallons,	2,850,412	3,300,916	10,079,180	35,698,159
Total value,	$304,917	$755,888	$1,956,187	$5,934,671
Value per gallon,	$0.11	$0.23	$0.19	$0.17
Mutton, pounds,	–	–	8,989,506	589,323
Total value,	–	–	$1,090,368	$55,374
Value per pound,	–	–	$0.12	$0.09
Oats, bushels,	1,238,159	792,982	678,779	457,710
Total value,	$405,657	$563,729	$587,133	$314,202
Value per bushel,	$0.33	$0.71	$0.86	$0.69
Acreage,	–	37,623¼	28,610¼	14,614¼
Bushels per acre,	–	21⅛	23¾	31¼
Onions, bushels,	–	240,971	210,831	359,706
Total value,	–	$187,446	$322,412	$338,205
Value per bushel,	–	$0.78	$1.53	$0.94
Acreage,	–	769⅞	839¼	1,045
Bushels per acre,	–	313	251	344¼
Parsnips, bushels,	–	–	–	30,377
Total value,	–	–	–	$24,977
Value per bushel,	–	–	–	$0.82
Acreage,	–	–	–	137¼
Bushels per acre,	–	–	–	221¾
Pears, bushels,	–	–	–	59,259
Total value,	–	$88,144	$243,068	$118,302
Value per bushel,	–	–	–	$2.00
Pork, pounds,	–	–	29,440,447	12,786,062
Total value,	–	–	$4,596,433	$1,272,409
Value per pound,	–	–	$0.16	$0.10
Potatoes, Irish, bushels,	4,767,115	3,991,456	3,832,523	3,630,546
Total value,	$1,309,030	$2,521,906	$2,499,845	$2,349,815
Value per bushel,	$0.27	$0.63	$0.65	$0.65
Acreage,	–	41,982⅞	42,082¾	33,616
Bushels per acre,	–	93¾	91	108
Poultry, pounds,	–	–	–	1,206,098
Total value,	$25,891	$52,688	$217,991	$263,395
Value per pound,	–	–	–	$0.22
Pumpkins, pounds,	–	–	–	4,214,881
Total value,	–	–	–	$37,789
Value per pound,	–	–	–	$0.009

Products.	1845.	1855.	1865.	1875.
Rye, bushels,	446,925	523,777	271,016	250,113
Total value,	$328,033	$560,201	$400,140	$248,437
Value per bushel,	$0.73	$1.07	$1.48	$0.99
Acreage,	-	42,143	24,205	21,351
Bushels per acre,	-	12½	11	11¾
Seeds, garden and flower, pounds,	-	-	-	28,307
Total value,	$4,721	-	$12,545	$43,310
Value per pound,	-	-	-	$1.53
Seeds, grass, bushels,	-	-	2,175	2,300
Total value,	-	-	$2,941	$4,041
Value per bushel,	-	-	$1.35	$1.76
Squashes, pounds,	-	-	-	6,978,689
Total value,	-	-	$96,611	$147,124
Value per pound,	-	-	-	$0.02
Straw, tons,	-	-	104	18,865
Total value,	-	-	$1,420	$267,066
Value per ton,	-	-	$13.65	$14.16
Strawberries, quarts,	-	-	-	1,156,801
Total value,	-	-	$30,728	$214,940
Value per quart,	-	-	-	$0.19
Tobacco, pounds,	265,560	-	9,306,067	5,993,666
Total value,	$16,686	$57,474	$1,577,100	$1,032,262
Value per pound,	$0.06	-	$0.17	$0.17
Acreage,	-	421	5,615⅞	3,757⅝
Pounds per acre,	-	-	1,657	1,595
Tomatoes, bushels,	-	-	-	230,565
Total value,	-	-	$23,160	$137,945
Value per bushel,	-	-	-	$0.60
Trees, Fruit, in nurseries, number,	-	-	-	215,770
Total value,	-	-	$10,650	$88,526
Value each,	-	-	-	$0.41
Turnips, bushels,	-	523,735	534,096	697,501
Total value,	-	$116,351	$187,913	$252,222
Value per bushel,	-	$0.22	$0.35	$0.36
Veal, pounds,	-	-	4,977,436	3,598,942
Total value,	-	-	$562,895	$363,517
Value per pound,	-	-	$0.11	$0.10
Wheat, bushels,	47,986	41,003	39,709	13,749
Total value,	$54,502	$73,928	$79,562	$23,105
Value per bushel,	$1,14	$1.82	$2.00	$1.68
Acreage,	-	2,600¼	2,667⅞	677¼
Bushels per acre,	-	15¾	14⅞	20⅓
Wool, merino, pounds,	487,050	188,504	236,103	70,927
Total value,	-	-	$196,198	$30,061
Value per pound,	-	-	$0.83	$0.42
Wool, Saxony, pounds,	93,218	14,549	12,789	6,430
Total value,	-	-	$6,718	$2,798
Value per pound,	-	-	$0.53	$0.44

PRODUCTS.	1845.	1855.	1865.	1875.
WOOL, other, . pounds,	435,962	213,103	361,363	129,578
Total value, . . .	–	–	$262,225	$51,704
Value per pound, . .	–	–	$0.73	$0.40
WOOL, all kinds, . pounds,	1,016,230	416,156	610,255	206,935
Total value, . . .	$365,136	$155,046	$465,141	$84,563
Value per pound, . .	$0.36	$0.37	$0.76	$0.41

Col. Wright, in reviewing these tables, says :—

In the foregoing table we have the true basis of comparison, quantity, and when it applies, acreage; the values are interesting as indicating the value of same quantity at different periods. For 1845 and 1855 gold was the standard, and of course for 1865 and 1875 the values should be reduced to a gold basis; this is done by dividing the currency value for 1865 by 1.57, and for 1875 by 1.12. The table just given shows only the chief products, and principally those where comparisons could be made for some or all of the years named. Very many products returned in 1875 found no place in former censuses, and are not mentioned in the table.

Much can be drawn from the foregoing table; it teaches the changes in crops, in value, in acreage, in average yield per acre, and the increase or decrease in the leading crops; the result is gratifying in many respects, for while it is seen that there is a loss in the great staple products of barley, corn, oats, potatoes, and wheat, there is for each of these crops an increased yield per acre; the lighter crops, beans, beets, carrots, cranberries, onions, and turnips, show large increase generally, not only in amount raised, but in yield per acre; the hay crop has increased in quantity and in average yield per acre.

The item of cheese in the foregoing table includes for 1875 that made upon farms only, while for the other years it comprises the total product of cheese, not only on farms, but from factories. The total product of cheese for 1875 was 3,067,017 pounds, valued at $405,293.

The egg and milk products exhibit wonderful progress, the latter growing from 2,850,412 gallons in 1845, and 10,079,180 gallons in 1865, to 35,698,159 gallons in 1875. Accompanying the great increase in the milk product will be noticed the decrease in the beef product, dropping from 70,825,396 pounds in 1865 to 12,258,542 pounds in 1875.

Tobacco loses, many farmers, during the past five years, having abandoned it as a crop. Raising small fruits, pears, etc., will be found to occupy considerable attention now, and their product has been returned for 1875, but there are no statistics of former years with which comparison can be made.

An examination of the relation of quantities raised to acres tilled convinces one that the farmers of Massachusetts have learned the important lesson of tilling less land and tilling it better, for we find that even in the crops where loss in the aggregate occurs there has been a great improvement in results. In 1855 it took 4,971½ acres to produce 99,430 bushels of barley; and in 1865, 7,103¾ acres to produce 138,524 bushels; while in 1875 it took but 1,828⅜ acres to produce 46,884 bushels; an increase in the average yield from 20 bushels to 25½ bushels to the acre. The beet crop increased from 193½ to 244⅝ bushels per acre, from 1865 to 1875. The product of corn per acre grew from 28¾ bushels in 1865 to 35¾ bushels in 1875. Onions, an important product, made an increase in quantity per acre, and the average yield of oats per acre increased from 21⅛ bushels in 1855 to 31¼ bushels in 1875; and potatoes from 91 bushels per acre in 1865 to 108 in 1875; and wheat from 15¾ in 1855 to 20⅓ in 1875.

The agriculture of Massachusetts can hardly be said to be on the decline with the facts before us; and the only statement which can tempt one to such belief, is the superficial one relative to what has been considered *the important* crops. It must be conceded, however, that the important crop is the one which soonest and surest brings substantial returns to the farmer; and if milk, eggs, or small fruits, or the leading fruits, will do this, then *they* become the important crops.

It is to be considered that the rapid growth of manufacturing villages has created numerous local markets, and our agriculture has adapted itself to their wants.

The following tables of aggregates give us, in a very compact form, the farm property of the State:—

COUNTIES.	Number of Farms.	Total Acreage in Farms.	Average Acreage in Farms.	Total Value of Farms (Land and Buildings).	Average Value of Farms.
THE STATE,	44,549	3,402,368⅞	76	$182,663,140	$4,100
Barnstable,	721	59,914	83	1,615,418	2,240
Berkshire,	3,791	470,594	124	15,073,948	3,976
Bristol,	3,570	217,368	61	11,881,683	3,328
Dukes,	371	33,945	91	678,890	1,830
Essex,	3,282	179,683¼	55	14,213,235	4,331
Franklin,	3,956	350,443⅜	88	11,352,503	2,870
Hampden,	3,736	316,015¼	85	14,496,445	3,880
Hampshire,	3,666	316,991½	86	12,260,330	3,344
Middlesex,	6,085	362,945½	60	36,375,185	5,978
Nantucket,	105	15,973	152	182,966	1,742
Norfolk,	2,331	135,112¼	58	10,746,735	4,610
Plymouth,	3,587	200,193	56	9,257,524	2,581
Suffolk,	369	8,203½	22	10,891,373	29,516
Worcester,	8,979	734,987¼	82	33,636,905	3,746

Included among the farms of the State, are the market-gardens, with acreage, value and average value per acre, as follows:—

COUNTIES.	Total Acreage in Market-gardens.	Total Value of Land in Market-gardens.	Average Value per Acre.
THE STATE,	3,988⅝	$1,147,200	$288
Barnstable,	21	1,957	93
Berkshire,	73	12,033	165
Bristol,	348	39,867	114
Dukes,	41	1,030	25
Essex,	428	78,563	183
Franklin,	214¼	12,448	58
Hampden,	464¼	54,325	117
Hampshire,	89	18,220	205
Middlesex,	1,233⅜	497,079	403
Nantucket,	10¼	1,560	152
Norfolk,	319¾	65,703	205
Plymouth,	111	15,997	144
Suffolk,	233	256,580	1,101
Worcester,	402¾	91,838	228

Of the whole number of farms in the State, 44,549, only 1,054 are carried on by proprietors who hire, while the great majority, 43,495, are carried on by the owners.

AGRICULTURAL PRODUCTS.

PRODUCTS.		Quantity.	Value.	Average Value.
Apples,	bush.,	3,252,957	$1,450,252	$0 45
Apricots,	bush.,	3,978	1,955	49
Asparagus,	b'ches,	521,408	55,669	11
Barberries,	bush.,	1,299	2,745	2 11
Basket willow,	lbs.,	6,300	240	04
Beans, string and shell,	bush.,	37,603	45,325	1 21
Beef,	lbs.,	12,258,542	1,068,154	09
Beeswax,	lbs.,	11,596	2,058	18
Beets, mangel-wurzel,	bush.,	22,140	6,676	30
Blackberries,	qts.,	93,164	12,728	14
Blueberries,	qts.,	219,483	20,156	09
Butter,	lbs.,	7,922,431	2,747,878	35
Butternuts,	bush.,	5,559	3,313	60
Cabbage,	heads,	7,660,722	440,691	06
Cabbage plants,		83,400	629	007
Carrageen,	lbs.,	128,430	2,372	02
Cauliflower,	heads,	108,601	10,758	10
Celery,	b'ches,	627,329	49,614	08
Celery plants,		31,910	1,865	06
Charcoal,	bush.,	1,015,073	120,556	12
Cheese,	lbs.,	1,280,234	162,826	13
Cherries,	bush.,	5,441	15,124	2 78
Chestnuts,	bush.,	3,046	8,362	2 75
Chiccory,	lbs.,	2,046	170	08
Cider,	gals.,	5,613,846	668,809	12
Citron melon,	lbs.,	400	13	03
Corn, broom,	lbs.,	63,821	5,075	08
Corn, green,	bush.,	199,496	134,170	67
Corn, pop,	bush.,	8,582	13,809	1 61
Crab-apples,	bush.,	2,313	3,446	1 49
Cranberries,	bush.,	110,184	288,113	2 61
Cream,	gals.,	4,470	4,487	1 00
Cucumbers,	bush.,	38,236	43,844	1 15
Cucumbers,		37,414,726	119,490	003

Products.		Quantity.	Value.	Average Value.
Currants,	qts.,	82,538	$10,605	$0 13
Dandelions,	bush.,	7,188	7,021	98
Eggs,	dozen,	3,446,530	903,357	26
Eggs, fancy,	dozen,	1,010	1,160	1 15
Eggs, game,	dozen,	40	240	6 00
Feathers,	lbs.,	15,985	3,834	24
Flax,	lbs.,	520	86	17
Flowers, leaves and vines, cut,		–	167,422	–
Fodder, barley,	tons,	91	1,371	15 07
Fodder, corn,	tons,	15,863	162,448	10 24
Fodder, oat,	tons,	2,634	44,538	16 91
Fodder, rye,	tons,	17	292	17 18
Game, wild,		–	2,675	–
Gooseberries,	qts.,	9,800	1,101	11
Grapes,	bush.,	19,836	32,635	1 65
Grapes,	lbs.,	267,617	34,624	13
Greens, beet,	bush.,	340	428	1 26
Greens, cabbage,	bush.,	2,882	2,586	90
Hair, for plastering,	lbs.,	8,136	265	03
Hemp,	lbs.,	8	2	25
Hides,		5,355	23,512	4 39
Honey,	lbs.,	70,717	20,331	29
Hop poles,		126,345	2,629	02
Hops,	lbs.,	22,133	7,556	34
Horse-radish,	lbs.,	245,892	10,262	04
Huckleberries,	qts.,	327,777	26,826	08
Ice,	tons,	395,184	500,666	1 27
Leeches,	dozen,	312	1,863	5 97
Lettuce,	heads,	2,683,211	96,410	04
Mangoes,	bush.,	33,531	14,659	44
Manure,	cords,	422,478	2,321,373	5 49
Manure, hen,	bush.,	357	201	56
Manure, sea,	cords,	21,670	30,587	1 41
Melons,		298,136	25,109	08
Milk,	gals.,	35,698,159	5,934,671	17
Millet,	bush.,	1,250	1,806	1 44
Mutton,	lbs.,	589,323	55,374	09
Oyster plant,	bush.,	180	183	1 02
Parsley,	bush.,	3,704	2,640	71
Peaches,	bush.,	15,942	44,893	2 82
Pears,	bush.,	59,259	118,302	2 00
Pease,	bush.,	5,490	9,164	1 70
Pease, green,	bush.,	68,294	96,512	1 41
Pelts,		1,957	2,190	1 12
Peppers,	bush.,	4,984	5,499	1 10
Plants, flowering and other, in greenhouses,		–	203,535	–
Plums,	bush.,	1,769	3,481	1 97
Pork,	lbs.,	12,786,062	1,272,409	10
Potatoes, sweet,	bush.,	267	369	1 38
Poultry, dressed chickens,	lbs.,	876,955	193,210	22
Poultry, dressed geese,	lbs.,	35,170	7,164	20
Poultry, dressed turkeys,	lbs.,	241,317	51,955	22
Poultry, dressed, other than chickens, geese and turkeys,	lbs.,	52,656	11,066	21
Pumpkins,	lbs.,	4,214,881	37,789	009
Quinces,	bush.,	3,011	9,334	3 10
Radishes,	b'ches,	90,527	4,480	05
Raspberries,	qts.,	67,109	14,214	21
Rhubarb,	lbs.,	350,478	6,573	02
Roots and herbs, medicinal and aromatic,	lbs.,	182,359	16,199	09

Products.		Quantity.	Value.	Average Value.
Seeds, garden and flower,	lbs.,	28,307	$43,410	$1 53
Seeds, grass,	bush.,	2,300	4,041	1 76
Shellbarks,	bush.,	1,190	2,764	2 32
Shrubs in nurseries,		256,056	14,919	06
Skins, calf,		75	135	1 80
Spinach,	bush.,	6,094	6,498	1 07
Squashes,	lbs.,	6,978,689	147,124	02
Straw,	tons,	18,865	267,066	14 16
Strawberries,	qts.,	1,156,801	214,940	19
Teasels,	lbs.,	1,800	200	11
Thimbleberries,	qts.,	200	20	10
Tomatoes,	bush.,	230,565	137,945	60
Tomato plants,		25,112	851	03
Trees, fruit, in nurseries,		215,770	88,526	41
Trees, ornamental, in nurseries,		224,982	36,004	16
Tripe,	lbs.,	115,128	7,567	07
Turnips, ruta-baga,	bush.,	2,427	545	22
Turnips, table,	bush.,	697,501	252,222	36
Veal,	lbs.,	3,598,942	363,517	10
Vines in nurseries,		60,789	12,478	21
Watercress,	b'ches,	3,500	280	08
Wool, merino,	lbs.,	70,927	30,061	42
Wool, Saxony,	lbs.,	6,430	2,798	44
Wool, other than merino and Saxony,	lbs.,	129,578	51,704	40

Agricultural Products (with Acreage).

Products.		Quantity.	Acreage.	Value.	Average Yield per Acre.	Average Value.
Barley,	bush.,	46,884	1,828⅜	$47,655	25½	$1 02
Beans,	bush.,	41,879	1,354⅛	97,052	31	2 32
Beets (table),	bush.,	215,740	884⅜	109,415	244	51
Buckwheat,	bush.,	52,127	3,609¼	46,911	14½	90
Carrots,	bush.,	191,646	439¼	86,503	436	45
Corn (Indian),	bush.,	1,040,290	29,193¾	1,006,384	35¾	97
Hay (clover),	tons,	3,443	2,959	51,903	1⅛	15 07
Hay (English),	tons,	526,490	509,294	9,106,159	1	17 30
Hay (meadow),	tons,	116,211	130,792	1,225,456	.88	10 55
Hay (millet),	tons,	2,418	1,619	41,918	1½	17 33
Hay (salt),	tons,	22,568	23,519	234,832	.96	10 46
Oats,	bush.,	457,710	14,614¼	314,202	31¼	69
Onions,	bush.,	359,706	1,045	338,205	344¼	94
Parsnips,	bush.,	30,377	137¼	24,977	221¼	82
Potatoes (Irish),	bush.,	3,630,546	33,616	2,349,815	108	65
Rye,	bush.,	250,113	21,351	248,437	11¾	99
Tobacco,	lbs.,	5,993,666	3,757⅝	1,032,262	1,595	17
Wheat,	bush.,	13,749	677¼	23,105	20⅓	1 68

Domestic Animals—Aggregates by Counties.

COUNTIES.	Bees (Swarms of).		Bulls.		Calves.		Colts.		Ducks.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
The State, .	8,365	$49,846	5,312	$188,260	38,099	$371,009	4,254	$389,066	9,884	$6,845
Barnstable, . .	91	736	71	2,365	501	4,503	37	3,350	992	548
Berkshire, . .	1,339	7,438	932	26,918	4,708	38,732	843	71,445	571	355
Bristol, . . .	850	4,477	209	6,780	2,364	21,824	199	24,102	1,939	1,370
Dukes, . . .	3	20	29	649	212	1,588	32	1,681	141	65
Essex, . . .	441	3,152	278	11,141	2,500	23,752	241	23,093	1,184	853
Franklin, . .	722	4,764	453	16,046	4,336	43,814	627	52,352	220	157
Hampden, . .	905	4,956	573	18,238	3,033	28,826	305	23,953	540	372
Hampshire, . .	667	3,588	546	17,322	3,603	33,959	418	35,261	284	194
Middlesex, . .	939	5,855	560	24,086	4,506	52,296	455	51,900	952	728
Nantucket, . .	18	196	29	794	125	869	19	1,720	78	54
Norfolk, . .	327	1,922	127	4,639	1,242	10,571	119	10,990	639	524
Plymouth, . .	627	3,527	149	5,993	1,532	14,960	158	12,987	971	607
Suffolk, . .	14	101	18	1,280	127	1,328	25	3,250	87	67
Worcester, . .	1,422	9,114	1,338	52,009	9,310	93,987	776	72,982	1,286	951

Aggregates by Counties—Con.

COUNTIES.	Milch Cows.		Mules.		Oxen.		Pigs.		Sheep (Merino).	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
The State, .	126,034	$6,054,136	203	$20,887	16,308	$1,345,204	41,009	$241,368	14,456	$58,290
Barnstable, . .	1,211	49,676	–	–	145	10,435	445	2,438	257	1,260
Berkshire, . .	15,527	714,185	25	2,525	1,422	105,781	3,694	19,025	7,675	29,165
Bristol, . . .	7,502	364,748	11	640	1,158	96,877	4,026	24,323	194	840
Dukes, . . .	552	19,322	13	1,130	133	7,880	156	809	127	346
Essex, . . .	9,151	471,401	24	2,145	1,762	149,522	2,008	15,079	26	203
Franklin, . .	10,271	415,398	8	690	1,692	148,120	3,707	19,905	2,611	10,104
Hampden, . .	9,891	447,119	10	1,750	1,955	149,047	2,443	13,813	563	2,449
Hampshire, . .	9,806	448,886	15	1,605	1,104	95,037	3,639	19,564	2,530	11,325
Middlesex, . .	20,244	1,068,223	31	3,170	1,206	105,358	7,522	46,752	63	424
Nantucket, . .	376	13,950	–	–	31	1,861	145	742	11	215
Norfolk, . .	5,743	274,019	18	2,582	367	29,790	3,088	17,800	36	96
Plymouth, . .	5,006	231,369	9	580	1,064	84,475	1,689	11,147	48	178
Suffolk, . . .	496	30,344	3	300	22	2,125	336	2,084	–	–
Worcester, . .	30,258	1,505,496	36	3,770	4,247	358,896	8,111	47,887	315	1,685

Domestic Animals—Aggregates by Counties.

Geese.		Heifers.		Hens and Chickens.		Hogs.		Horses.		Lambs.	
No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
7,003	$8,008	28,057	$667,355	1,012,784	$575,374	42,255	$721,955	53,218	$5,805,485	29,294	$115,001
76	103	340	6,924	36,862	16,489	574	10,194	763	73,158	330	1,296
644	937	3,967	86,843	78,678	38,527	3,831	64,320	5,635	625,343	7,421	25,064
1,389	2,216	994	25,444	144,360	89,584	3,513	64,775	4,109	430,240	913	3,877
90	85	172	3,422	10,322	5,089	158	2,616	307	26,520	1,438	2,213
230	437	1,426	33,881	77,185	45,518	2,343	46,125	4,067	483,508	538	2,441
199	340	3,348	80,883	57,680	27,810	3,441	50,019	4,098	423,298	8,049	34,898
253	414	2,445	51,141	70,419	37,009	3,410	51,256	4,151	431,363	2,617	10,534
105	149	2,832	63,563	57,839	30,294	3,898	63,057	4,388	467,288	3,610	13,951
209	302	3,451	91,524	147,165	91,417	7,543	134,621	8,716	1,032,929	385	1,889
14	21	89	1,502	3,392	2,582	127	3,295	122	15,450	521	1,688
114	150	732	20,258	48,334	30,776	2,917	50,072	2,742	300,559	170	1,061
3,101	1,794	827	20,820	87,429	51,134	2,357	45,552	3,357	356,009	1,174	6,033
5	5	61	1,505	5,165	3,622	581	10,240	580	96,845	–	–
576	1,055	7,373	179,645	187,954	105,523	7,562	125,813	10,183	1,042,975	2,128	10,056

Aggregates by Counties—Con.

Sheep (Saxony).		Other Sheep.		Steers.		Turkeys.		Other Animals.		Total Value of Domestic Animals.
No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	
1,631	$7,993	42,686	$179,934	10,448	$354,924	23,738	$32,542	39,582	$122,899	$17,316,381
22	125	294	2,588	137	3,539	216	253	270	1,081	191,061
769	3,201	8,400	41,550	1,540	51,511	3,980	4,681	1,897	9,285	1,966,891
54	418	1,096	4,427	216	8,093	1,725	2,891	2,814	9,391	1,187,337
–	–	9,087	18,297	141	3,498	329	474	109	255	95,959
9	88	586	3,470	274	9,695	972	1,378	3,011	7,313	1,334,195
232	1,020	8,475	39,673	2,092	68,868	2,156	2,848	1,289	9,833	1,450,840
16	120	3,284	15,007	1,278	47,320	3,684	5,316	13,351	12,275	1,352,278
189	1,028	5,292	23,453	1,524	48,920	1,544	2,510	1,416	10,116	1,391,070
8	60	608	3,646	281	10,801	1,816	2,181	5,030	21,557	2,749,719
–	–	1,287	4,561	33	905	191	245	12	11	50,661
2	10	502	2,151	18	790	157	273	1,663	6,067	765,100
131	632	1,442	7,703	260	10,090	1,454	1,901	3,021	8,256	875,747
–	–	–	–	–	–	–	–	373	2,113	155,209
199	1,231	2,333	13,408	2,654	90,894	5,514	7,591	5,326	25,346	3,750,314

FARM PROPERTY AGGREGATES.

COUNTIES.	Number of Farms.	Number of Buildings.	Value of Buildings.	Acres of Land.	Value of Land.
THE STATE, .	44,549	118,063	$66,033,291	3,402,368⅞	$116,629,849
Barnstable, .	721	1,820	771,939	59,914	843,479
Berkshire, .	3,791	12,149	5,004,277	470,594	10,069,671
Bristol, . .	3,570	10,096	4,641,818	217,368	7,239,865
Dukes, . .	371	978	247,432	33,945	431,458
Essex, . .	3,282	8,294	5,321,407	170,683¼	8,891,828
Franklin, . .	3,956	10,223	3,967,091	350,443⅜	7,385,412
Hampden, .	3,736	9,645	5,104,606	316,015¼	9,391,839
Hampshire, .	3,666	9,627	4,788,319	316,991½	7,472,011
Middlesex, .	6,085	15,984	13,808,976	362,945½	22,566,209
Nantucket, .	105	286	72,475	15,973	111,491
Norfolk, . .	2,331	5,571	4,496,075	135,112¼	6,256,660
Plymouth, .	3,587	9,406	4,373,259	200,193	4,844,265
Suffolk, . .	369	678	1,469,025	8,203½	9,422,348
Worcester, .	8,979	23,303	11,973,592	734,987¼	21,663,313

COUNTIES.	Value of Farms (Land and Buildings).	Value of Fruit Trees and Vines.	Value of Domestic Animals.	Value of Agricultural Implements in Use.	Total Value Farm Property.
THE STATE,	$182,663,140	$4,674,188	$17,316,381	$5,321,168	$209,974,877
Barnstable, .	1,615,418	44,280	191,061	48,722	1,899,481
Berkshire, .	15,073,948	399,584	1,966,891	469,073	17,909,496
Bristol, . .	11,881,683	186,448	1,187,337	333,645	13,591,113
Dukes, . .	678,890	9,926	95,959	14,508	799,283
Essex, . .	14,213,235	486,429	1,334,195	483,869	16,517,728
Franklin, . .	11,352,503	270,514	1,450,840	438,127	13,511,984
Hampden, .	14,496,445	257,782	1,352,278	394,355	16,500,860
Hampshire, .	12,260,330	271,988	1,391,070	455,998	14,389,386
Middlesex, .	36,385,185	1,049,884	2,749,719	957,653	41,132,441
Nantucket, .	182,866	234	50,661	8,784	242,645
Norfolk, . .	10,746,735	230,797	765,100	263,816	12,006,448
Plymouth, .	9,257,524	237,501	875,747	209,932	10,580,704
Suffolk, . .	10,891,373	114,208	155,209	64,682	11,225,472
Worcester, .	33,636,905	1,114,613	3,750,314	1,176,004	39,677,836

PERSONS EMPLOYED IN AGRICULTURE: WAGES, NUMBER OF FARMS, AND ACRES OF CULTIVATED AND UNCULTIVATED LAND.

COUNTIES.	Number of Farms.	FARM LAND.		PERSONS EMPLOYED.					WAGES, includ'g board, paid during the year ending May 1, 1875.
		CULTIVATED.	UNCULTIVATED.	MALES.		FEMALES.		Total.	
		Acres.	Acres.	Under 15.	Above 15.	Under 15.	Above 15.		
THE STATE,	44,549	912,521	2,489,847⅞	2,136	24,961	805	7,586	35,488	$5,600,919
Barnstable, .	721	11,861	48,053	49	380	36	205	670	38,180
Berkshire, .	3,791	131,035	339,559	186	2,560	77	1,119	3,942	523,177
Bristol, .	3,570	51,555	165,813	219	2,032	94	425	2,770	378,107
Dukes, . .	371	4,893	29,052	16	132	–	90	238	6,523
Essex, . .	3,282	66,104¼	113,579	171	2,332	23	418	2,944	550,744
Franklin, .	3,956	79,871⅜	270,572	173	1,910	80	923	3,086	324,490
Hampden, .	3,736	79,726¼	236,289	190	2,042	106	711	3,049	445,226
Hampshire, .	3,666	98,311½	218,680	161	1,978	56	790	2,985	385,551
Middlesex, .	6,085	120,160⅛	242,785⅜	315	4,225	102	999	5,641	1,204,796
Nantucket, .	105	1,680¾	14,292¼	1	45	–	1	47	10,720
Norfolk, .	2,331	36,559	98,553¼	91	1,421	13	112	1,637	374,305
Plymouth, .	3,587	40,666¼	159,526¾	86	1,249	13	229	1,577	248,967
Suffolk, .	369	4,164¼	4,039¼	13	379	3	70	465	143,918
Worcester, .	8,979	185,933¼	549,054	465	4,276	202	1,494	6,437	965,695

AGGREGATES OF FARM PROPERTY.

FARM PROPERTY.	Number.	Value.	Average Value.
I.—FARMS.			
Farms containing less than 3 acres,	724		
" " more than 3 and less than 5 acres,	896		
" " from 5 to 10 acres (both inclusive),	2,694		
" " more than 10 acres,	40,235		
Farms, all sizes. [The value given is that of land and buildings combined.]	44,549	$182,663,140	$4,100 27
II.—BUILDINGS.			
Dwelling houses,	43,620		
Barns,	46,848		
Carriage houses,	2,899		
Cheese houses,	56		
Cider mills,	325		
Corn houses,	1,480		
Granaries,	1,057		
Greenhouses,	277		
Grist and saw mills,	127		
Ice houses,	263		
Mills,	44		
Out-houses,	3,950		
Sheds,	13,383		
Shops,	2,610		
Slaughter houses,	94		
Stables,	293		
Storehouses,	20		
Sugar houses,	144		
Tobacco barns,	571		
Buildings, all kinds,	118,063	$66,033,291	
III.—LAND.			
Cultivated—Land under crops, acres,	882,178¼	$57,961,529	$65 70
Market-gardens, acres,	3,988⅝	1,147,200	287 62
Nurseries and seed-gardens, acres,	736⅞	335,179	454 86
Orchards, acres,	25,617¼	2,643,801	103 20
Uncultivated—Unimproved land, acres,	1,466,615⅛	32,058,448	21 85
Unimprovable land, acres,	92,830¼	414,534	3 70
Woodland, acres,	930,402½	22,069,158	23 72
Land, all kinds, acres,	3,402,368⅞	$116,629,849	$34 28
IV.—FRUIT TREES AND VINES.			
Apple trees,	1,861,204	$3,656,271	$1 96
Apricot trees,	11	14	1 27
Butternut trees,	24	34	1 42
Cherry trees,	12,040	31,517	2 62
Chestnut trees,	13	60	4 61
Crab-apple trees,	1,131	2,013	1 78
Fig trees,	50	250	5 00
Fruit trees, not designated,	26,820	36,067	1 34
Hickory trees,	4	25	6 25
Mulberry trees,	8	20	2 50
Nectarine trees,	5	18	3 60
Peach trees,	82,884	93,871	1 13
Pear trees,	231,229	601,138	2 60
Plum trees,	3,958	7,363	1 86
Pomegranate trees,	8	50	6 25
Quince trees,	6,120	8,918	1 45
Shellbark trees,	221	632	2 86
Walnut trees,	121	163	1 35
Grape vines,	224,352	235,764	1 05
Fruit trees and vines, all kinds,	. . . .	$4,674,188	

RECAPITULATION OF AGGREGATES—Concluded.

FARM PROPERTY.	Number.	Value.	Average Value.
V.—DOMESTIC ANIMALS.			
Asses,	30	$1,600	$53 33
Bees (swarms of),	8,365	49,846	5 96
Buffalo,	1	100	100 00
Bulls,	5,312	188,260	35 44
Calves,	38,099	371,009	9 74
Colts,	4,254	389,066	91 46
Dogs,	11,489	110,877	9 65
Ducks,	9,884	6,845	69
Geese,	7,003	8,008	1 14
Goats,	201	872	4 34
Guinea fowls,	3,102	2,129	68
Heifers,	28,057	667,355	23 78
Hens and chickens,	1,012,784	575,374	57
Hogs,	42,255	721,955	17 08
Horses,	53,218	5,805,485	109 09
Lambs,	29,294	115,001	3 92
Milch cows,	126,034	6,054,136	48 03
Mules,	203	20,887	102 89
Oxen,	16,308	1,345,204	82 48
Pea fowls,	389	666	1 71
Pigeons,	24,370	6,655	27
Pigs,	41,009	241,368	5 88
Sheep, merino,	14,456	58,290	4 03
Saxony,	1,631	7,993	4 90
other,	42,686	179,934	4 21
Steers,	10,448	354,924	33 97
Turkeys,	23,738	32,542	1 37
Domestic animals, all kinds,	. . .	$17,316,381	

INDEX

TO THE SECRETARY'S REPORT.

Page
Agricultural College, examining committee for 1877, ... 241
Agricultural exhibitions, times of holding certain, changed, ... 238
Agricultural statistics from Massachusetts census, 1875, ... 295
American guano and its value, ... 77
Ammoniated superphosphate and its value, ... 269
Animal dust as a fertilizer, ... 255, 256
Annual poultry product of the United States, ... 55, 60
Apple orchards, should they be ploughed? 21, 38, 39
Apple orchards, soil and location for, ... 17
Apples, best varieties of, for New England orchards, . . . 19, 20, 38, 42, 46
Apples, how produced in odd years, ... 25, 26, 38, 39, 47, 52
Apples, how they should be gathered and handled, ... 26, 29, 31
Apples valuable as a feed for milch cows, ... 17, 36, 37, 46
Apple-trees around walls not so profitable as in orchards, ... 41
Arboriculture, importance of, to the agricultural community, ... 227, 229
Art and agriculture, essay upon, ... 285, 293
Ayrshires, and their value for the dairy, ... 115, 117, 128

Bat guano, ... 267, 268
Best method for setting hens, ... 65
Best varieties of apples, ... 19, 20
Black Spanish fowls and their characteristics, ... 59, 82
Board of Agriculture, country meeting of, at Worcester, first day, . . . 6
Board of Agriculture, country meeting of, at Worcester, second day, . . 55
Board of Agriculture, country meeting of, at Worcester, third day, . . . 142
Board of Agriculture, country meeting of, for 1877, place of, ... 238
Bone-meal as a fertilizer, ... 257
Boneblack and its value, ... 258
Brahma fowls, characteristics of, ... 57
Breeding and management of poultry, ... 55, 70, 80, 86
Breeding in-and-in, effect of, among poultry, ... 72, 73
Brighton animal dust as a fertilizer, ... 255, 256
Brockville superphosphates and their value, ... 260
Buds, essay upon, ... 233, 235, 237
Butter, want of uniformity in manufacture of, ... 101, 119, 121

Cabbages and their cultivation, ... 207, 209
Cabbages, experiments with fertilizers on, ... 178
Caribbean guano, ... 258
Carrots and their cultivation, ... 197, 198, 201
Cattle commissioners, annual report of, ... 213
Chadbourne, Prof. P. A., essay by, on buds, ... 233, 235, 237

Page
Change in the market for vegetables within a few years, ... 187
Cheever, A. W., lecture by, ... 98, 105, 115
Chemical fertilizers and their value, . 142, 153, 158, 162, 170, 174, 180, 182, 241, 256
Chickens, how to feed, ... 79, 80
Chili saltpetre, analysis of, ... 252
City milk, ... 105, 106, 107, 109
Cleanliness essential in poultry husbandry, ... 60, 61
Cochin fowls and their value, ... 60
Colonies of fowls, ... 63, 64
Colorado beetle, enemies of, ... 92
Colorado beetle in Massachusetts, ... 86, 90, 94, 95
Colorado beetle, habits of, ... 90, 91
Colorado beetle, history of its migrations, ... 88, 89
Colorado beetle, remedies against the ravages of the, . 92, 93, 96, 151, 293, 295
Concrete houses, value of, ... 132
Confines of the dairy section, ... 122
Corkiness in turnips, how to prevent, ... 203
Corn, yield of, and cost of raising per bushel, . . . 156, 158, 160, 171, 178, 183
Crookneck squash, little demand for, ... 211
Cross-fertilization, influence of, ... 235

Dairy cows, and how they should be fed, ... 113, 114, 123
Dairy farming and its importance, ... 103, 105, 112, 116, 117
Dairy products and their management, ... 102, 110, 116, 120, 123
Dairy work, how it should be done, ... 102, 119, 123
Danvers onion, qualities of, ... 189
Delegates to exhibitions in 1877, appointment of, ... 239
Dominique fowls and their characteristics, ... 59
Dorkings and their value, ... 85
Drought of 1876 and its influence on crops, ... 146, 148
Dwight D., essay by, ... 215, 218

Essays, subjects for, in 1877, ... 240
Examining committee of the Agricultural College for 1877, ... 241
Exhibitions in 1877, appointment of delegates to, ... 239
Experimental station desirable in Massachusetts, ... 165, 166
Experiments with commercial fertilizers, ... 148, 151, 153, 168, 171, 174

Farmer's homestead, relation of the, to farm thrift, ... 131, 142
Felch, I. K., lecture by, upon poultry husbandry, ... 55, 65, 70
Fertilizers, their value and application, . . 148, 151, 162, 170, 174, 182, 241, 256
Fertilizer from ashes of hulls of cotton-seeds, ... 248
Fertilizers, potash, ... 244, 246
Fertilizers, report of Prof. C. A. Goessmann upon, . . . 241, 250, 256, 260, 279
Fish guano, value of, ... 279
Food for poultry should be of a varied character, ... 62, 63, 78
Fotler early drumhead cabbage, history of, ... 208
Fowls, how to breed improved varieties of, ... 68, 69, 70
Fowls need a gravelly soil, ... 75
Fruits and fruit-culture, ... 13, 20, 28, 35, 40, 45, 50, 53
Fruit, how it should be gathered and kept, ... 26, 27, 28, 31
Fruit-cellars, and how they should be managed, ... 27

Game fowls and their characteristics, ... 81
Goessmann, Prof. C. A., report on fertilizers by, . . . 241, 250, 256, 260, 279
Goessmann, Prof. C. A., report on salt-marshes by, ... 219, 223, 225
Gold, T. S., lecture by, ... 13, 20, 28

Page
Gravelly soils best for fowls, 75
Ground bones as a fertilizer, 257, 258
Guanos and their value, 259, 260, 261, 265

Hadwen, O. B., address by 7, 10, 13
Hadwen, O. B., report by, 227, 229
Habits of the Colorado beetle, 90, 91
Hand-picking the Colorado beetle efficacious, 96, 97
Hamburg fowls and their characteristics, 58, 59, 84
Hens, period in which they are profitable layers, 84
Hens, the best method of setting, 65
High prices for poultry, 67
Horn-waste as a fertilizer, 254
Houdan fowls and their value, 59
Household conveniences should be cared for, 135
How to breed improved varieties of fowls, 68, 70
How to feed young chickens, 79, 80
How to grow good potatoes, 188, 189
How to train and prune orchard trees, 23, 24, 44, 45
Hubbard squash and its cultivation, 209

Influence of the sire in poultry-breeding, 68, 74
Improvement of salt-marshes, report on, 219, 223, 225
Isolated apple-trees not so profitable as those in orchards, 41

Jerseys, and their value for the dairy, 117, 129
June the best month to prune apple-trees in, 24, 25

Leghorn fowls and their characteristics, 57, 70, 71, 75, 83

Mangolds, cultivation and yield of, 206, 207
Mangolds, experiments with fertilizers in cultivating, 176, 177
Manures and chemical fertilizers, 77, 142, 156, 170, 184
Manures for apple orchards, 19, 21, 43
Marrow squashes and their cultivation, 209
Massachusetts, desirable breeds of cows for, 110, 111
Migration eastward of the Colorado beetle, history of, 88, 89
Milch cows, and how they should be fed, 113, 114
Milch cows, value of apples as food for, 17, 36, 37
Milk-supply, growth of the, 105, 106
Mitchell, Donald G., lecture by, 131, 139
Muriate of potash, analysis of, 245

Native cows and their utility, 127
Needs of the Massachusetts dairy farmer, lecture on, 98, 100, 115
Nitrate of soda, analysis of, 252
Nitrogen necessary to plant-life, 143, 149

Odd years, how apples are produced in, 25, 38, 47, 48, 52
Onion-maggot, habits of the, and remedy against, 195
Onions and their cultivation, 189, 191, 193
Orchards, and their management, 13, 20, 28, 39, 44, 46
Organic matter in salt marshes, 225

Packard, A. S., Jr., essay by, on the Colorado beetle, 86, 90, 94
Pasture land, experiments with chemical fertilizers upon, 178, 179
Pears and pear-growing, 32, 33, 50, 51

Page
Pear orchards, utility of manuring, 50
Peruvian guano, 260, 261
Plant-nutrition, principles of, 145, 146, 147
Ploughing of orchards, is it injurious ? 21, 39
Plymouth Rock fowls, value and characteristics of, 57
Potash fertilizers and their value, 244, 246
Potatoes, experiments with fertilizers in cultivating, 174, 175
Potatoes, how to grow, 188, 189
Poultry, breeding and management of, 55, 70, 80, 86
Poultry-house, plan for the construction of, 61, 62, 63, 76
Poultry manure pays the cost of feed for fowls, 76, 77
Profits of poultry-keeping, 56, 57, 76, 77
Public meeting of the Board in 1877, place of, 238

Rectified Peruvian guano and its value, 261
Remedies against the ravages of the Colorado beetle, 92, 93
Roup and its contagiousness, 86

Salt-marshes adapted to pear-growing, 50, 52
Salt-marshes, report on the improvement of, 219, 223, 225
Saltpetre-waste as a fertilizer, 249
Salt valuable as a fertilizer for onions, 197
Sea-fowl guano, 270
Size and conduct of farms in Massachusetts, essay upon, 215, 218
Spring the best season for planting apple-trees in, 20
Squash-bugs, how to destroy, 210
Squash-houses, 211
Squashes and their cultivation, 209, 210, 211
Soil of salt-marshes, character of, 223
Statistics from Massachusetts census for 1875, 295
Stockbridge fertilizers and their value, 145, 156, 159
Stockbridge, Prof. Levi, lecture by, 142, 148, 152
Stone houses, economy of 133
Stone-Mason cabbage, origin of, 207, 208
Subjects for essays in 1877, 240
Sulphate of ammonia, analysis of, 251

Transplanting forest trees, best time for, 231
Treatment of Peruvian guano, 263
Trees from sprouts not desirable, 35
Turban squashes and their value, 209
Turnips, and how to grow them, 202, 203, 205

Vegetable-gardening and root-culture, 185, 200, 213
Vegetable market has changed, 186, 187
Vermin on poultry, how destroyed, 66, 79
Vicar of Winkfield pear, characteristics of, 16
Vincent, Hebron, essay by, 285, 293

Ward's fertilizer of little value, 250, 251
Ware, Benjamin P., lecture by, 185, 200, 213
Warm water best for cows in winter, 125
Western fruit-trees undesirable for New England orchards, 34, 35, 51
Wool-waste as a fertilizer, 253
Worcester, exhibition at, in connection with the meeting of the Board, 281

Yield of corn in various experiments, 156, 158, 160, 171, 177, 178, 183
Yield of mangolds to the acre, 206
Yield and cultivation of onions, 197

INDEX TO ABSTRACT, OR PART SECOND.

Page
Agricultural College, Mass., value of, and how it could be made more useful, 31, 32, 33, 35
Agricultural societies, establishment and growth of, 16, 18, 21, 25, 29, 30
Agriculture in Massachusetts, changes in, 31, 36
Agriculture, progress of, in the last one hundred years, 21, 27
Agriculture, relations of, to civilization, 1, 7, 10
Albuminoids, necessity of, in cattle foods, 44, 45
Alden, John F., statement of, 99
Apples, best varieties of, and their cultivation, 81, 82, 84, 89, 91, 92, 94, 96, 98
Appleton, Francis H., statement of, 133
Appleton, Francis R., statement of, 118

Barley, statement on, 112
Bartlett, Albert C., statement of, 141, 143
Bassett, Josiah L., statement of, 126
Beets, statement on, 124
Best varieties of apples and their cultivation, 81, 82, 84, 89, 91, 94, 96, 98
Boutwell, Geo. S., address by, 31, 36
Bread, report of committee on, 161

Cabbages and their cultivation, 133
Canedy, D., statement of, 109
Canfield, Horace J., address by, 16, 18, 21, 25, 29, 30
Carleton, Daniel, statement of, 135
Carrots, statements on, 123, 126
Colorado beetle, ravages of, in Massachusetts, 35
Copeland, Heman, statement of, 125
Cotton-seed meal rich in albuminoids, 44

Dairy products, report of committees on, 146, 148
Dairy stock, reports of committees on, 146, 148
Dairy stock, statements on, 146, 147, 149, 150, 151, 152

Eaton, Thomas S., report by, 148, 150
Establishment and growth of agricultural societies, 16, 18, 21, 25, 29, 30

Farlow, W. G., essay by, on onion-smut, 164, 168, 173, 174
Farms, reports of committees on, 55, 57, 58
Fertilizers, experiments with, 55, 56, 101, 102, 104, 106, 121, 124, 125
Flint, James, statement of, 94
Fodder-corn, how and when valueless, 46, 47, 48
French, J. D. W., report by, 146
Fruit-culture, 78, 81, 82, 84, 89, 91, 92, 94, 96, 98, 99

Gardner, Nathan B., statement of, 124
Goodwin, Rufus, statement of, 58

	Page
Graves, Alonzo, statement of,	73
Gregory, J. J. H., essay by, on originating new varieties of potatoes,	37, 42
Gregory, J. J. H., statement of,	62
Hall, L. R., statement of,	99
Haskell, H. C., statement of,	151
Hawks, E. C., statement of,	74, 76
Hawks, Fred. W., statement of,	105
Heifers, report of committee on,	148
Horses, report of committee on,	154, 157
Horton, Joseph, statement of,	66
Howard, James, statement of,	111, 125
Howes George, statement of,	123
How six acres can summer twelve cattle,	52, 54
Humphrey, George W., statement of,	105
Hungarian grass rich in albuminoids,	44, 45
Huntington, Benjamin F., statement of	98
Improving pasture and waste lands,	64, 66, 69, 73, 74, 76
Improving wet meadows, report of the committee on,	59, 62
Improving wet meadows, statement on,	62
Indian corn and its cultivation,	101, 105, 108
Laws relating to agricultural societies,	180, 184
Laws relating to Board of Agriculture,	177, 179
Leonard, Spencer, statements of,	110, 125, 128
Lovett, Francis S., statement of,	82
Low, Aaron, statement of,	115
Macy, Alexander, Jr., report by,	158, 160
Mangolds and their cultivation,	121, 125, 126
Marston, J. B., statement of,	93
Manures and their application,	55, 56, 101, 103, 106, 121, 125, 144
McKinstry, A. L., essay by,	52, 54
Mellen, L. F., address by,	11, 15
Merrill, Hayden A., statement of,	133
Newhall J., statement of,	144
Oats, statement on,	112
Onions, cultivation of, and cost of raising,	135, 136
Onion-smut, essay on,	164, 167, 171, 174
Peck, A. P., statement of,	137, 138
Pierce, Mrs. John, report by,	161, 163
Poultry and their management,	158, 160
Potatoes and their cultivation,	37, 42, 119, 120, 127, 128
Potatoes, essay on originating new varieties of,	37, 42
Potatoes, natural home of,	38
Potatoes, proper localities for growing,	38
Potatoes, statements on,	119, 127, 128
Powers, J. W., report by,	152, 153
Pratt, Mrs. Lucy J., statement of,	81
Puffer, Loring W., report by,	139, 141
Putnam, Ansel W., essay by,	43, 48, 51
Reed, Charles M., statement of,	110

Page
Requirements of Board of Agriculture, ... 185
Root crops, reports on, ... 113, 115
Roots and their value for cattle food, ... 50, 51
Rotch, Wm. J., report by, ... 128, 130
Russell, John E., report by, ... 154, 157
Ruta-bagas and their cultivation, ... 118
Rye, statement on, ... 110, 111

Salt hay, value of, as a cattle food, ... 45, 49
Seedling potatoes, where best originated, ... 38
Sears, John H., statement of, ... 96
Sessions, H. M., statements of, ... 69, 103, 119
Shepherd, Henry, statement of, ... 150
Soiling cattle, ... 52, 54
Soule, Augustus H., statement of, ... 112
Special fertilizers and their value, . . 55, 56, 101, 102, 103, 104, 106, 121, 124, 125
Squashes and their cultivation, ... 134
Statistics of Massachusetts agriculture, ... 186
Stiles, H. A., statement of, ... 116
Stockbridge fertilizers, value of, ... 31, 32, 103, 106, 121, 124
Strawberries and their cultivation, ... 99
Sturtevant Brothers, statement of, ... 101

Taylor, George W., statement of, ... 85
Thayer, Peter C., statement of, ... 76, 77
Thomas, Albert, statements of, ... 112, 127
Thurlow, T. C., statement of, ... 89
Tracy, Cyrus M., address by, ... 1, 6, 10
Treadwell farm, report on, ... 55, 56
Turnips, best varieties and cultivation of, ... 116, 122, 125

Vegetables, reports of committees on, ... 131, 137, 139, 141

Wait, Peter, statement of, ... 84
Wakefield, Horace P., statements of, ... 120, 121
Wallis, Horace, Jr., statements of, ... 104, 120
Ware, R. C., statement of, ... 92
Wheat and its cultivation, ... 109
Wheat bran, value of, as a cattle food, ... 50
Williams, F. H., statement of, ... 122

Young grass richest in albuminoids, ... 46, 49